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ENCYCLOPÆDIA BRITANNICA

REVISED AND AMENDED.

A DICTIONARY OF ARTS, SCIENCES AND LITERATURE

TO WHICH IS ADDED

BIOGRAPHIES OF LIVING SUBJECTS

96 Colored Maps and Numerous Illustrations.



EDITED BY

W. H. DEPUY, D.D., LL.D.

And a Corps of Eminent Writers.

VOL. VIII.—MAN—PAR.



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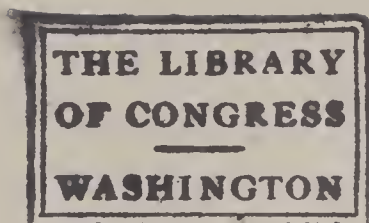
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Noire, Ludwig.
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Nordica, Lillian.
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 Owen, Richard.
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 Owen, Robert Dale.
 Owens, John E.
 Oxenden, Ashton, Bishop.
 Paca, William.
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 Packer, Asa.

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 Paddock, Benjamin H., Bishop.
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 Palmer, Alonzo B., Prof.
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 Palmer, Bertha (Mrs. Potter).
 Palmer, Erastus Dow.
 Palmer, Innis Newton, Gen.
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 Palmer, Ray.
 Palmer, Sir Charles.
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NEW AMERICANIZED ENCYCLOPÆDIA BRITANNICA.

VOLUME VIII.

M A N

MANCHESTER is a post-town of Chesterfield county, Va., situated on the James river, opposite Richmond. It has several flouring-mills and manufactories of cotton, paper, iron, nails, and tobacco. The water power here is of great value, and the town is one of the most flourishing in the State. Population (1890), 9,246.

MANCHURIA is the name by which the territory in the east of Asia occupied by the Manchus is known in Europe. By the Chinese it is called the country of the Manchows, or Manchus, an epithet meaning "Pure," chosen by the founder of the dynasty which now rules over Manchuria and China as an appropriate designation for his family. Manchuria as it has existed for upward of two centuries—that is to say, since it has had an historical existence—is a tract of country wedged in between China and Mongolia on the west and northwest, and Corea and the Russian territory on the Amur on the east and north. The territory thus defined is about 800 miles in length and 500 miles in width, and contains about 390,000 square miles. It is divided into three provinces, viz., Tsitsihar or Northern Manchuria, Kirin or Central Manchuria, and Leaou-tung or Southern Manchuria.

Moukden, or, as it is called by the Chinese, Shing-yang, the capital city of Manchuria, is situated in the province of Leaou-tung. The population is estimated at about 200,000, including that of the suburbs, the richest and most extensive of which are on the western and southern faces of the city. Leaou-yang, which was once the capital of the country, also stands in the province of Leaou-tung, but it is not now a place of much importance. The population of the whole province of Leaou-tung is estimated to be about 12,000,000.

The province of Kirin, or Central Manchuria, is bounded on the north and northwest by the Sungari, on the south by Leaou-tung and Corea, on the west by a line of palisades, and on the east by the Usuri and the maritime Russian provinces. It contains an area of about 135,000 square miles, and is entirely mountainous with the exception of a

stretch of plain country in its northwestern corner. This plain produces large quantities of indigo and opium. Ashehoh, on the Ashe, with its population of 40,000; Petuna *Sinice* Sing-chung, on the Sungari, population 30,000; San-Sing, near the junction of the Sungari and Hurka; La-lin, 120 miles to the north of Kirin, population 20,000; and Ninguta, are the other principal cities in the province.

Tsitsihar, or Northern Manchuria, which contains about 195,000 square miles, is bounded on the north and northeast by the Amur, on the south by the Sungari, and on the west by the Nonni and Mongolia. This province is thinly populated, and is cultivated only along the lines of its rivers. The only towns of any importance are Tsitsihar and Mergen, both situated on the Nonni.

MANDÆANS, also known as Sabians, Nasoræans, or St. John's Christians, an Oriental sect of great antiquity, interesting to the theologian as almost the only surviving examples of a religion compounded of Christian, heathen, and Jewish elements on a type which is essentially that of ancient Gnosticism.

The Mandæans, who can never have been numerous, and are now much decayed, are found in the marshy lands of South Babylonia.

MANDALAY, the capital of Burmah, is situated about two miles from the left bank of the Irawadi river. It was founded by the king of Burmah, who transferred to it the seat of government from Amara-pura in 1860. The palace of the king occupies the central space of the city; the walls of its inclosure are laid symmetrically with those of the city, and each face is about 370 yards in length. Population estimated at 65,000.

MANDAMUS, WRIT OF, in English law, is usually described as a high prerogative writ, containing a command in the name of the king, and issuing from the King's Bench, directed to persons, corporations, and inferior courts, ordering them to do a specific act within the duty of their office.

The writ has passed into the law of the United States. There is in the federal judiciary an employment of the

writ substantially as the old prerogative writ in the King's Bench practice, also as a mode of exercising appellate jurisdiction, also as a proceeding ancillary to a judgment previously rendered, in exercise of original jurisdiction, as when a circuit court having rendered a judgment against a county issues a mandamus requiring its officers to levy a tax to provide for the payment of the judgment. And in the various States mandamus is used under varying regulations, mandate being in some cases substituted as the name of the proceeding.

MANDATE (MANDATUM). The contract of *mandatum* in Roman law was constituted by one person (the *mandatarius*) promising to do something gratuitously at the request of another (the *mandator*), who undertakes to indemnify him against loss. The jurists distinguished the different cases of *mandatum* according as the object of the contract was the benefit of the mandator or a third person singly, or the mandator and a third person, the mandator and the *mandatarius*, or the *mandatarius* and a third person together. The essentials and the terminology of the contract are preserved in most modern systems of law.

MANDEVILLE, BERNARD DE, born in 1670, is generally known as an ethical writer of debasing and degrading tendency, but he was at least as much of a humorist as a philosopher. He was a native of Rotterdam, where his father practiced as a physician for thirty years. A remarkably eloquent school-boy exercise, *De Medicina Oratio Scholastica*, was printed for him at Rotterdam in 1685. He studied for six years at Leyden, and took his degree in medicine in 1691. Immediately afterward he went over to England "to learn the language," which he did to some purpose, writing it with such mastery as to throw doubts upon his foreign extraction. He settled in London as a physician. The *Fable of the Bees* is the general title of the miscellaneous work by which he is known to fame. Died in 1733.

MANDEVILLE, JEHAN DE, the name claimed by the compiler of a singular book of travels, written in French, and published between 1357 and 1371. By aid of translations into many other languages it acquired extraordinary popularity, while a few interpolated words in a particular edition of the English version have gained for Mandeville in modern times the spurious credit of being "the father of English prose."

MANDI, a native state in the Punjab, India, bounded on the north and east by Kullu, on the south by Suket, and on the west by Kángará. The country is mountainous, being intersected by two great parallel ranges, reaching to an average height of from 5,000 to 7,000 feet above the sea. The valleys between the hill ranges are very fertile, and produce all the ordinary grains, besides more valuable crops of rice, maize, sugar-cane, poppy, and tobacco. The area of the state is estimated at about 1,200 square miles, and a census in 1881 gives the population as 147,017.

MANDINGOES, otherwise known as WANGARAWA, MALINKES, or WAKORE (the last probably their primitive designation), are one of the most widely distributed and important peoples of Western Africa to the north of the equator, and perhaps form the best representatives of the Negro stock. The country of Manding, from which their ordinary name is derived, is a comparatively small district on both banks of the Niger. A Mandingo empire, usually called after Mali, the chief town, which stood on the bank of the Niger to the north of Buré, was founded by a certain prince Baramindana or Baramangole in the twelfth century; and its power was gradually extended till, in the reign of Mansa Musa (1311-31), Songhai, Timbuctoo, and, in fact, the whole of the Sudan with the exception of Genné on the Niger, were more or less thoroughly subjugated. Tim-

buctoo finally fell into the hands of the Berbers about 1433; but Mali remained a leading state and its capital a great commercial center till the beginning of the sixteenth century, when Omar Askia, prince of Songhai, captured the city. The Mali dynasty was a Mohammedan one; and, though some sections of the Mandingo race are still pagans, the greater number are ardent supporters of Islam. Of the present grouping and relations of the states in which they are the dominant element, detailed information does not exist.

MANDLA, a district in the chief commissionership of the Central Provinces, India, has an area of 4,719 square miles, and the headquarters are at Mandla town. The district consists of a wild highland region, broken up by the valleys of numerous rivers and streams. In the lower valleys there is abundance of rich black cotton soil, while in the less favored valleys a light friable soil is found. The Nerbudda river flows through the center of the district, receiving several tributaries which take their rise in the Maikal Hills, a range densely clothed with *sál* forest, and forming part of the great watershed between eastern and western India. Tigers and wild beasts abound, and the proportion of deaths caused by wild animals is greater in Mandla than in any other district of the Central Provinces. The census of 1872 disclosed a population of 213,018 (males, 110,473; females, 102,545).

MANDOLIN. See LUTE.

MANDRAKE, *Mandragora officinarum*, L., of the potato family, order *Solanaceæ*, is a native of Spain, Sicily, Crete, Cilicia, Syria, etc., and North Africa. It has a short stem bearing a tuft of ovate leaves, with a thick fleshy and often forked root. The flowers are solitary, with a purple bell-shaped corolla. The fruit is a fleshy, orange-colored berry. The mandrake has been long known for its poisonous properties and supposed virtues. It acts as an emetic, purgative, and narcotic, and was much esteemed in old times; but, except in Africa and the East, where it is used as a narcotic and antispasmodic, it has fallen into disrepute. In ancient times, according to Isidorus and Serapion, it was used as a narcotic to diminish sensibility under surgical operations. (See PODOPHYLLIN.)

MANDRILL, the name of one of the most remarkable, at all events in outward appearance, of the Baboons, *Cynocephalus maimon* or *mormon*. The general characteristics of the genus to which it belongs are given in the article APE.

The baboons generally are distinguished from other monkeys by the comparative equality of the length of their limbs, which with the structure of the vertebral column adapts them rather for quadrupedal progression on the ground than for climbing among the branches of trees. They are also remarkable for the great size of their face and jaws as compared with the part of the skull which incloses the brain. The Mandrill, in addition to these characteristics, is distinguished by the heaviness of its body, stoutness and strength of its limbs, and exceeding shortness of its tail, which is a mere stump, not two inches long, and usually carried erect. It is, moreover, remarkable for the prominence of its brow ridges, beneath which the small and closely approximated eyes are deeply sunk; the immense size of the canine teeth; the great development of a pair of oval bony prominences on the maxillary bones in front of the orbits, rising on each side of the median line of the face, and covered by a longitudinally-ribbed naked skin; and more especially for the extraordinarily vivid coloring of some parts of the skin. It would be difficult to imagine a more hideous beast.

MANDURIA, a city of Italy in the province of Lecce, twenty-two miles east of Taranto on the road to

Lecce, in the midst of a wide open country. Population, 8,500.

MANES. This term, which is clearly euphemistic, meaning "goodies" or "good fellows," was applied by the Romans to the spirits of the departed. As in all nations of antiquity, and in many existing savage tribes, these spirits were held by them in great awe and veneration, as being powerful for good or for harm. The doctrine, whether imported from the Egyptian theology or of Turanian origin through the Etruscan tomb-builders, is closely allied to that of the Greek belief in the existence of the souls of heroes, ancestors, and generally of the "mighty dead," whom they call *daimones*, but, of course, in a sense widely different from our notion of *demons*.

MANETHO. Manetho Sebennyta, *Mai en Thoth*, "beloved by Thoth," Egyptian priest and annalist, was a native of Sebennytus (Semmenúd), in the Delta. His name is connected by Plutarch with the reign of Ptolemy I., and he is usually stated to have written under Ptolemy II. Philadelphus, though the only authority for this is an epistle to that king of the Pseudo-Manetho, author of the forged *Book of Sothis* preserved by Syncellus. He was instructed in Greek—so Josephus tells us—and the three books of his *History of Egypt*, composed in that language, opened to foreigners the history of Egypt from the mythical period downward, as it was preserved in the records of the priests. Unhappily the book is now known only by some lists and fragments preserved by Josephus in his treatise *Against Apion* by Eusebius in his *Chronica*, and by Syncellus.

MANFRED, regent and king of the Two Sicilies, a natural son of the emperor Frederick II. by Bianca Lanzia, the daughter of a Lombard earl, was born in Sicily about 1231, and received from his father the title of prince of Tarentum in 1248. Frederick II. at his death appointed him regent of the Two Sicilies during the absence of his brother Conrad IV., and he was able, in 1252, to hand over to Conrad an undivided sovereignty. On the death of the latter in 1254, Manfred was once more called to the regency in the interests of his infant nephew Conradin, and by his victory over the forces of Innocent IV. at Foggia, on December 2d of that year, was able to establish his authority over the entire kingdom. Manfred, yielding to the solicitations of his prelates, barons, and people, allowed himself to be crowned at Palermo on August 11, 1258. Excommunicated in 1259 by Alexander IV., Manfred again resorted to arms, and overrunning the papal states, was made master of Tuscany by the battle of Monte Aperto (September 4, 1260). Now at the height of his power, he was anew excommunicated by Urban IV. in 1261, and, in 1263, his forfeited crown was offered to Charles, count of Anjou, and brother of Louis IX. of France. Toward the end of summer in 1265, giving effect to a crusade proclaimed by Urban, Charles, with his army, entered Piedmont, but the encounter with the Sicilians did not take place until February, 1266, at Benevento, where Manfred, filled with despair by the cowardly flight of his Apulians, spurred into the thickest of the battle and fell, covered with wounds.

MANFREDONIA, a seaport and city of Italy, in the province of Foggia, the see of an archbishop and the center of a maritime district, lies twenty-two miles northeast of Foggia, with which it is connected by railway. Population, 9,600.

MANGALIA, a town on the coast of the Black Sea, in the south of the Dobrudja, at the head of a district in the new Roumanian province of Kustendji. In the time of Genoese supremacy in the Black Sea it was a place of 30,000 inhabitants, and its population has again risen from a few hundreds to upward of 2,000.

MANGALORE, the administrative headquarters of south Kánara district, Madras, is situated on the Malabar coast, with a population of 29,667.

MANGANESÉ, a metallic chemical element widely diffused throughout the mineral kingdom, being an almost constant companion of ferrous oxide, lime, and magnesia in their native carbonates and silicates. Of manganese minerals proper, which are comparatively scarce, the most important is *pyrolusite*, the native binoxide. This is a black crystalline or crystallized solid with semi-metallic luster, sufficiently soft to give a (black) streak on paper. It is known in commerce as "black oxide of manganese," or "manganese," and is extensively used for the industrial extraction of chlorine from muriatic acid. Its most extensive beds are found at Ilmenau and Elgersburg, Thuringia; near Giessen, North Hesse; near Mährisch-Trübau, Moravia; and in Spain. For the making of manganese preparations, high-class pyrolusite is the most convenient raw material.

MANGEL WURZEL. See AGRICULTURE.

MANGO. The mango-tree (*Mangifera indica*, L., natural order *Anacardiaceæ* or *Terebinthaceæ*) is a native of tropical Asia, but during the last hundred years has been extensively cultivated in the tropical and subtropical regions of the New as well as the Old World. It grows rapidly to a height of thirty to forty feet, and its dense, spreading, and glossy foliage would secure its cultivation for the sake of its shade and beauty alone. Its fruit, a drupe, though in the wild variety (not to be confused with that of *Spondias mangifera*, Pers., belonging to the same order, also called wild mango in India) stringy and sour from its containing much gallic acid, and with a disagreeable flavor of turpentine, has become sweet and luscious through culture and selection, to which we owe many varieties differing not only in flavor, but also in size, from that of a plum to that of an apple. When unripe they are used to make pickles, tarts, and preserves; ripe, they form a wholesome and very agreeable dessert.

MANGOSTEEN, *Garcinia mangostana*, L., is a tree belonging to the gamboge order (*Clusiaceæ* or *Guttiferae*). It is a native of the Molucca Islands, but has been introduced into the other islands of the Eastern archipelago, Ceylon, and southern Asia, and even the Antilles, though not without difficulty. It grows about twenty feet high, and is somewhat fir-like in general form, but the leaves are large, oval, entire, coriaceous, and glistening. Its fruit, the much-valued mangosteen, is about the size and shape of an orange, and is somewhat similarly partitioned, but is of a reddish-brown to chestnut color.

MANGROVE. The remarkable "mangrove forests" which fringe tidal estuaries, overrun salt marshes, and line muddy coasts in the tropics of both Old and New Worlds, are composed of trees and shrubs belonging to the *Rhizophoraceæ*, a small order of calycifloral exogens, mixed, however, with the "white mangrove," *Avicennia*, a verbenaceous plant. Their trunks and branches constantly emit adventitious roots, which, descending in arched fashion, strike at some distance from the parent stem, and send up new trunks, the forest thus spreading like a banyan grove. The roots and stems afford lodgment and shelter to innumerable bivalves, crabs, and other marine animals, while the branches are inhabited by aquatic birds. A further advantage in dispersal, very characteristic of the order, is afforded by the seeds, which have a striking peculiarity of germination. While the fruit is still attached to the parent branch, the long radicle emerges from the seed and descends rapidly toward the mud, where it may even establish itself before falling off. Owing to

its clubbed shape, this is always in the right position, the plumule then making its appearance. The wood of some species is hard and durable, and the astringent bark is employed in tanning. The fruit of the common mangrove, *Rhizophora Mangle*, L., is sweet and wholesome, and yields a light wine.

MANICHÆISM. At the close of the third century three great religious systems stood opposed to one another in western Asia and the south of Europe; these were Neo-Platonism, Catholicism, and Manichæism. All three may be described as the final results reached, after a history of more than a thousand years, by the religious development of the civilized nations stretching from Persia to Italy. Each had put off the national and particular character of the ancient religions, and had become a world-religion, with universalizing tendencies, and with demands which in their effect transformed the whole of human life, both public and private.

According to the Mohammedan tradition Mani was a high-born Persian of Ecbatana. The year of his birth is uncertain, but Kessler accepts as reliable the statement made by Bîrûnî, that Mani was born in the year 527 of the astronomers of Babylon, (215–216 A.D.)

Mani himself composed a large number of works and epistles, which were in great part still known to the Mohammedan historians, but are now lost. The later heads of the Manichæan churches also wrote religious treatises, so that the ancient Manichæan literature must have been very extensive. According to the *Fihrist*, Mani made use of the Persian and Syriac languages; but, like the Oriental Marcionites before him, he invented an alphabet of his own, which the *Fihrist* has handed down to us. In this alphabet the sacred books of the Manichæans were written even at a late period. The *Fihrist* reckons seven principal works of Mani, six being in the Syriac and one in the Persian language.

The Manichæan system is one of consistent, uncompromising dualism, in the form of a fantastic philosophy of nature. The physical and the ethical are not distinguished, and in this respect the character of the system is thoroughly materialistic; for when Mani coördinates good with light, and evil with darkness, this is no mere figure of speech, but light is actually the only good, and darkness the only evil. From this it follows that religious knowledge can be nothing else than the knowledge of nature and her elements, and that redemption can only consist in a physical process of freeing the element of light from the darkness. Under such circumstances ethics becomes a doctrine of abstinence in regard to all elements which have their source within the sphere of darkness.

The Christian Byzantine and Roman emperors, from Valens onward, enacted strict laws against the Manichæans. But at first these bore little fruit. The auditors were difficult to trace out, and besides they really gave little occasion for persecution. In Rome itself between 370 and 440 Manichæism gained a large amount of support, especially among the scholars and public teachers. It also made its way into the life of the people by means of a popular literature in which the apostles were made to play a prominent part (*Apocryphal Acts of the Apostles*). Manichæism in the West had also some experience of attempts at reformation from the ascetic side, but of these we know little. In Rome Leo the Great was the first who took energetic measures, along with the state authorities, against the system. Valentinian III. decreed banishment against its adherents, Justinian the punishment of death. In North Africa Manichæism appears to have been extinguished by the persecution of the Vandals. But it still continued to exist elsewhere, both in the Byzantine empire and in the West, and in the earlier part of the Middle Ages it gave

an impulse to the formation of new sects, which remained related to it. And, if it has not been quite proved that so early as the fourth century the Priscillianists of Spain were influenced by Manichæism, it is at least undoubted that the Paulicians and Bogomiles as well as the Catharists and the Albigenses are to be traced back to Manichæism (and Marcionitism). Thus the system, not indeed of Mani the Persian, but of Manichæism as modified by Christian influences, accompanied the Catholic Church until the thirteenth century.

MANILA (less correctly **MANILLA**), the capital of Luzon and the Philippine Islands, and the center of Spanish commerce in the East, was founded by Legaspi in 1571, and is situated on the eastern shore of a circular bay 120 nautical miles in circumference. Manila, hemp (*abaca*), sugar, cigars, and coffee are the chief articles of export; and sapan wood, mother of pearl, and gum are regular though secondary items. Population, 200,000.

MANILA HEMP, the most valuable of all fibers for cordage, is the product of the leaf-stalks of *Musa textilis*, a native of the Philippine Islands. The plant, called *abaca* by the islanders, throws up a spurious stem from its rhizome, consisting of a cluster of sheathing leaf-stalks which rise to a height of from twenty to thirty feet, and spread out into a crown of huge undivided leaves characteristic of the various species of *Musa*. In its native regions the plant is rudely cultivated solely as a source of fiber; it requires little attention, and when about three years old develops flowers on a central stem, at which stage it is in the most favorable condition for yielding fiber. Each stalk yields, on an average, a little under one pound of fiber; and two natives cutting down plants and separating fiber will prepare not more than twenty-five pounds per day. The fiber yielded by the outer layer of leaf-stalks is hard, fully developed, and strong, but the produce of the inner stalks is increasingly thin, fine, and weak. The inner fiber is used by the natives, without spinning or twisting (the ends of the single fibers being knotted together), for making exceedingly fine, light, and transparent yet comparatively strong textures, which they use as articles of dress and ornament. The hemp exported for cordage purposes is a somewhat woody fiber, of a bright brownish-white color, and possessing great durability and strain-resisting power. It contains a very considerable amount of adherent pectinous matter, and an unusually large proportion, as much as 12 per cent., of water in a dry condition. In a damp atmosphere the fiber absorbs moisture so freely that it has been found to contain not less than 40 per cent. of water, a circumstance which dealers in the raw fiber should bear in mind. The plant has been introduced into many tropical lands; but the cheapness of labor in its native regions, and its abundance there, prevent its being a profitable substance for general cultivation. The entire supply comes from Manila and Cebu in the Philippine Islands, where its cultivation and preparation give employment to a very large population.

MANILIUS, a Roman poet, was the author of a poem in five books called *Astronomica*. Nothing is recorded of the author; he is neither quoted nor mentioned by any ancient writer. His very name is uncertain, but was probably Marcus Manilius.

MANIN, DANIELE, president of the Venetian republic in 1848–49, and one of the principal founders of Italian independence, was born in Venice on May 13, 1804. He studied at Padua, graduating as doctor of laws when only seventeen years of age, and soon after translated Pothier's large treatise *Sur le Droit Romain*.

In 1847 he spoke ably on political economy at the scientific congress held in Venice, and soon after presented two petitions to the "congregation"—a shadowy

deliberative assembly which was tolerated by Austria. His principal demands were—separate government of Venice and Lombardy, revision of the code, an annual budget, freedom of the press, and religious equality. On January 18, 1848, soon after Radetsky's cruel treatment of Milan, he was arrested, but only to intensify the patriotic enthusiasm of the people. On March 17th Manin was carried in triumph to the Place St. Mark, and virtually declared dictator. Now that the moment for action was come he immediately formed a civic guard, and by his energy and earnestness inspired all classes of the citizens to act as one man. On the 22d the dictator became president of the new republic of St. Mark, to cope alone with all the difficulties of administration, organization, and finance. In March, 1849, on the defeat of King Charles Albert, Venice had to prepare herself resolutely for defense; and on April 2d there was passed in the palace of the Doges a decree in two clauses:—“(1) Venice will resist the Austrians at whatever cost; (2) the president Manin is invested with unlimited powers.” On May 26th one outlying fort was taken, but on July 3d, when Rome and Mazzini had succumbed to the French, Venice and Manin were still strenuous in their heroic defense. Only when cholera had also attacked them, when food and ammunition were spent and people were dying of hunger, when every house not burned down was riddled by the shot and shell of the bombardment, and no gleam of hope from without was visible, was the capitulation signed, August 24, on terms of amnesty to all except the president and thirty-nine other citizens.

Leaving Venice on the 27th, with his wife and two children, Manin spent the rest of his life in Paris, where he maintained a modest independence by teaching his native language. His energies were still devoted to the unification of Italy, so that, whether as a republic or as a kingdom, she might be freed from Austrian domination. He died of heart disease on September 22, 1857, and was buried in the family tomb of Ary Scheffer. In 1868 the remains were removed to Venice, and honored with a public funeral.

MANIOC or MANDIOC. See CASSAVA and ARROW-ROOT.

MANIPUR, a native state in northeastern India, inhabited by various independent wild hill tribes of Lushais, Kukis, etc. The state consists of an extensive valley, estimated at about 650 square miles in extent, and a large surrounding unsurveyed tract of difficult mountainous country stretching between Assam, CÁCHÁR, Burmah, and Chittagong. The total area is estimated at about 7,600 square miles. The population of the Manipur valley and the surrounding hills is supposed to be about 74,000 hill-men and 65,000 Manipuris.

MANIS. See PANGOLIN.

MANISA, or MANISSA, a town of Asia Minor or Anatolia, situated on the north side of Mount Sipylus, twenty-eight miles northeast of Smyrna. This town was anciently called *Magnesia ad Sipylum* (see MAGNESIA). It is situated on the banks of the Hermus, and is noted as being one of the neatest and cleanest cities in Asia Minor. It is the seat of some considerable trade, and many of the inhabitants are employed in the manufacture of cotton and silk goods and goats' hair shawls. Population, about 40,000.

MANISTEE, the county seat of Manistee county, Mich., is situated 135 miles northwest of Lansing, on the east side of Lake Michigan, at the mouth of the Manistee river, which is navigable for vessels drawing ten to twelve feet of water for the distance of one and one-half miles to Manistee Lake. It is a great seat of the lumber trade, shipping annually 200,000,000 feet of

timber, and having a score of saw-mills and about as many shingle-mills, the latter of which produce in the year 400,000,000 shingles—the largest quantity made at any one place in the world. Planing-mills and foundries are also maintained; and, in consequence of the discovery in 1881 of a bed of solid salt thirty feet thick, extensive salt factories have been built. The surrounding district is especially adapted for fruit-growing; and sportsmen are attracted to the Manistee river and its tributaries by the abundance of the rarely found grayling. The population, 3,373 in 1870, was 7,080 in 1880, and is now (1890 census) 12,812.

MANITOBA, the prairie province of the Dominion of Canada, and formerly known as the Red River Settlement, is situated midway between the Atlantic and the Pacific coasts of the Dominion, about 1,490 miles west of Quebec. It is bounded on the south by the parallel 49° N. latitude, which divides it from the United States; on the west by 101° 20' W. longitude; on the north by 52° 50' N. latitude; and on the east by the western boundary of Ontario, in west longitude 95°. Manitoba formerly belonged to the HUDSON'S BAY COMPANY (*q.v.*), and was, after the transfer of the territory to Canada, admitted in 1870 as the fifth province of the Dominion. At that time the infant province had an area of 14,340 square miles, and some 12,000 people, chiefly half-breeds. In 1881 the limits were increased to the extent indicated above, and now contain, taking the Lake of the Woods as the eastern boundary, upward of 80,000 square miles, or 51,000,000 acres, an area only 8,782 square miles less than that of England and Scotland together, extending 264 miles from north to south, and upward of 300 from east to west. The old district of Assiniboine, the result of the efforts in colonization by the earl of Selkirk, in 1811, and succeeding years, was the nucleus of the province. Manitoba was so called by the Dominion parliament after the lake of that name; the designation is usually considered to be a compound of the Ojibway words, Manitou, great spirit, and Waba, straits between lakes, or a word meaning echo.

The drainage of Manitoba is entirely northeastward to Hudson's Bay. The three lakes—whose greatest lengths are 270, 150, and 130 miles, respectively—are Winnipeg, Winnipegosis, and Manitoba. They are all of a very varying and irregular shape, but average respectively 30, 18, and 10 miles in width. They are fresh, shallow, and tideless. The chief rivers emptying into Lake Winnipeg are the Winnipeg, the Red, and the Saskatchewan. The Assiniboine river, with its source in the province, and navigable from 250 to 350 miles for steamers of light draft, enters the Red river forty-five miles from Lake Winnipeg; and at the confluence of the rivers (“The Forks”) is situated the city of Winnipeg. The Winnipeg, which flows from the territory lying southeast of Lake Winnipeg, is a fine river some 200 miles long, that after leaving Lake of the Woods, dashes with its clear water over many cascades, and traverses very beautiful scenery. At its falls from Lake of the Woods is one of the greatest and most easily utilized water-powers in the world. Like most rivers in the New World, the Red river is at intervals of years subject to freshets. The loose soil on the banks of the river is every year carried away in great masses, and the channel has so widened as to render the recurrence of an overflow unlikely. The Saskatchewan, though not in the province, empties into Lake Winnipeg less than half a degree from the northern boundary. It is a mighty river, rising in the Rocky Mountains, and crossing eighteen degrees of longitude. Near its mouth are the Grand Rapids. Above these, steamers ply to Fort Edmonton, a point upward of 800

miles northwest of the city of Winnipeg. Steamers run from Grand Rapids, through Lake Winnipeg, up Red river to the city of Winnipeg.

The surface of Manitoba is somewhat level and monotonous. It is chiefly a prairie region, with treeless plains of from five to forty miles extent, covered in summer with an exuberant vegetable growth, which dies every year. The river banks are, however, fringed with trees, and in the more undulating lands the timber belts vary from a few hundreds of yards to five or ten miles in width, forming at times forests of no inconsiderable size. The chief trees of the country are the aspen (*Populus tremuloides*) the ash-leaved maple (*Negundo aceroides*), oak (*Quercus alba*), elm (*Ulmus americana*), and many varieties of willow. The strawberry, raspberry, currant, plum, cherry, and grape are indigenous.

The climate of Manitoba, being that of a region of wide extent and of similar conditions, is not subject to frequent variations. Winter, with cold but clear and bracing weather, usually sets in about the middle of November, and ends with March, in April and May the rivers have opened, the snow has disappeared, and the opportunity has been afforded the farmer of sowing his grain. The month of June is often wet, but most favorable for the springing crops; July and August are warm, but excepting two or three days at a time, not uncomfortably so; while the autumn months of August and September are very pleasant. Harvest generally extends from the middle of August to near the end of September. The chief crops of the farmer are wheat (which from its flinty hardness and full kernel is the specialty of the Canadian northwest), oats, barley, and peas. Hay is made of the native prairie grasses, which grow luxuriantly. From the richness and fertility of the soil potatoes and all root crops reach a great size. Heavy dews in summer give the needed moisture after the rains of June have ceased.

The population of the province is very mixed. In 1870 there were 2,000 whites and 10,000 Indian half-breeds. Of the latter, one-half are of English speaking parentage, and chiefly of Orkney origin; the remainder are known as Metis or Bois-brûlés, and are descended from French-Canadian voyageurs. In 1875 a number of Russian Mennonites (descendants of the Anabaptists of the Reformation) came to the country. Some fifty years ago they originally emigrated from Germany to the plains of southern Russia, but came over to Manitoba to escape the conscription. They number nearly 8,000. About 4,000 French Canadians, who had emigrated from Quebec to the United States, have also made the province their home, as well as a number of Icelanders. The remainder of the population is chiefly made up of English-speaking people from the other provinces of the Dominion, from the United States, from England and Scotland, and the north of Ireland. Though somewhat difficult to estimate, the population of Manitoba is estimated by competent authorities at upward of 66,000.

Like other provinces of the Dominion, Manitoba is under a lieutenant-governor, with a council of five ministers responsible to the local legislature, which again is composed of thirty-eight members. The province is represented by three senators in the Dominion senate, and by five members in the Dominion house of commons. There are three judges of the superior court, and a number of county court judges. The whole province is divided into municipalities, each of which chooses a warden and six councilors annually.

The city of WINNIPEG (*q.v.*), the provincial center of government, law, education, and religion, has 33,000 inhabitants. The trade of the country has chiefly grown up since Winnipeg was connected in 1878 with the

United States railroad system, and it has received a further impulse from the construction of the Canadian Pacific Railway, which traverses the territory. Other chief towns in the province are Brandon, Portage la Prairie, Selkirk, Minnedosa, Emerson, Birtle, and Morris.

MANITOWOC, a city of the United States, the county seat of Manitowoc county, Wis., is situated on the west side of Lake Michigan, at the mouth of Manitowoc river, seventy-seven miles from Milwaukee by the Milwaukee, Lake Shore and Western Railway. It has a good harbor, and is the seat of an active trade in lumber, leather, and wheat. Shipbuilding is also extensively carried on. Population (1890), 7,525.

MANKATO, the county seat of Blue Earth county, Minn., is situated in the midst of a good agricultural district on the right bank of the Minnesota river, and is a station on the Chicago, Milwaukee and St. Paul, the Chicago and North-Western, and the Chicago, St. Paul, Minneapolis and Omaha railways. From St. Paul it is distant eighty-six miles. Population, 8,838.

MANLEY, MARY DE LA RIVIER, dramatist, political writer, and novelist, the most eminent female "wit" of the reign of Queen Anne, was the daughter of a studious and literary royalist, Sir Roger Manley, governor of the Channel Islands, part author of *The Turkish Spy*, and author of several military histories. Mrs. Manley is herself the chief authority for such particulars of her private life as are known. Toward the close of Anne's reign, finding that Curll had announced *The Adventures of Rivella, or the History of the Author of Atalantis*, and suspecting this to be the work of an enemy, she contrived with dexterous tact to supplant Curll's author, and wrote her own biography under the announced title. She achieved her principal triumph as a writer by her *Secret Memoirs of Several Persons of Quality*, a scandalous chronicle "from the New Atalantis, an island in the Mediterranean," published in 1709. Henceforth she was known as the "author of *Atalantis*." She was born in 1672, and died in 1724.

MANLIUS is the name of a Roman gens, chiefly patrician, but, in later times at least, also containing plebeian families. The Roman historians represent them as intrepid, but stern even to cruelty.

I. MARCUS MANLIUS CAPITOLINUS, a brave and distinguished soldier, was one of the garrison of the Capitol while besieged by the Gauls; when they attempted to scale the rock by night, Manlius, aroused by the crackling of the sacred geese, rushed to the spot and threw down the foremost.

II. TITUS MANLIUS IMPERIOSUS TORQUATUS went to the tribune Pomponius, who had brought his father to trial for overstepping the limits of his office, and threatened to kill him unless he desisted from the accusation (365 B.C.). Shortly after he slew a gigantic Gaul in single combat, and took from him a torques or neck-ornament, whence his surname is said to have been derived.

Both these Manlii belong to a great extent to legend, much of which is probably due to attempts to explain their surnames.

III. TITUS MANLIUS TORQUATUS in his first consulship (235 B.C.) subjugated Sardinia, recently acquired from the Carthaginians; he was consul again (224) during the Gallic war. In 216 he opposed the ransoming of the Romans taken prisoners at Cannæ; and in 215 he was sent to Sardinia and defeated a Carthaginian attempt to regain possession of the island.

IV. CNÆUS MANLIUS VULSO, consul in 189 B.C., received Asia as his province. Starting from Ephesus in the spring, he marched into Pamphylia, levying enormous contributions. He then attacked the Celts of

Galatia on the pretext that they had aided Antiochus. They took refuge in Mounts Olympus and Magaba, but the missiles of the Roman light troops won each position with great slaughter. In the winter, assisted by ten delegates sent from Rome, he settled the terms of peace with Antiochus. He returned to Rome in 187, and triumphed after much opposition. The discipline of his army was loose, and his soldiers brought into Rome many foreign luxuries.

MANN, HORACE, one of the best known of American educationists, was born at Franklin, Mass., May 4, 1796, and died at Yellow Springs, Ohio, August 2, 1859. He entered the junior classes in Brown University in the year 1816. He graduated in 1819. In 1821 he entered the school of law at Litchfield, Conn., and was called to the bar in 1823. In 1827 he was elected to the State legislature of Massachusetts, and in 1833 he was returned to the upper house. He suggested and organized the State lunatic asylum of Worcester. In 1837 the legislature appointed a board of education to revise and reorganize the common school system of the State; and Mann was appointed secretary.

In 1848 Mann was elected to Congress to fill the vacancy caused by the death of John Quincy Adams. He tried to induce the government to establish a bureau of education at Washington, but this was not done till much later. He resigned his seat in Congress in 1853, and became the first president of Antioch College, at Yellow Springs—a college for the combined education of men and women. Mann's chief work in American education is the reform which he brought about in the common and normal school system of Massachusetts; and this reform is largely due to his twelve annual reports.

MANNA, a concrete saccharine exudation obtained by making incisions in the trunk of the flowering or manna ash tree, *Fraxinus Ornus*, L. At the present day the manna of commerce is collected exclusively in Sicily from cultivated trees, chiefly in the districts around Capaci, Carini, Cinisi, and Favara, small towns twenty to twenty-five miles west of Palermo, and in the townships of Geraci, Castelbuono, and other places in the district of Cefalù, fifty to seventy miles east of Palermo.

The manna of the present day appears to have been unknown before the fifteenth century, although a mountain in Sicily with the Arabic name Gibelman, *i.e.*, "manna mountain," appears to point to its collection there during the period that the island was held by the Saracens, 827–1070.

The manna of Scripture, notwithstanding the miraculous circumstances which distinguished it in the Biblical narrative from anything now known, answers in its description very closely to the tamarisk manna.

MANNHEIM, the most populous town and the second capital of the grand-duchy of Baden, lies on the right bank of the Rhine, in the triangular piece of low-lying ground inclosed between that river and the Neckar. It is the most regularly built town in Germany, consisting of twelve parallel streets intersected at right angles by ten others, which cut it up into about 130 square sections of equal size. These blocks are distinguished, after the American fashion, by letters and numerals. Except on the south side all the streets debouch on the promenade, which forms a circle round the town on the site of the old ramparts. Outside this ring are the suburbs of Schwetzingen Gärten to the south and Neckargärten to the north. Mannheim is connected by a handsome bridge with Ludwigshafen, a rapidly growing commercial and manufacturing town on the left bank of the Rhine, in Bavarian territory. The Neckar is spanned by a suspension bridge. Mannheim contains 53,545 inhabitants, of whom about 4,500 are

Jews, and the rest Roman Catholics and Protestants in nearly equal proportions. Ludwigshafen contains 15,012 inhabitants.

The history of the modern Mannheim begins with the opening of the seventeenth century, when Elector John Frederick IV. founded a town here, which he peopled chiefly with Protestant refugees from Holland. The strongly fortified castle which he erected at the same time had the unfortunate result of making the infant town an object of contention in the Thirty Years' War, during which it was five times taken and retaken. In 1689 Mannheim, which had in the meantime recovered from its former disasters, was captured by the French under Melac, and ruthlessly destroyed. Ten years later it was rebuilt on an extended scale and provided with fortifications. For its subsequent importance it was indebted to Elector Charles Philip, who, owing to ecclesiastical disputes, transferred his residence from Heidelberg to Mannheim in 1720. It remained the capital of the Palatinate for nearly sixty years. In 1794 Mannheim fell into the hands of the French, and in the following year it was retaken by the Austrians after a severe bombardment, which left scarcely a single building uninjured. In 1802 it was assigned to the grand-duke of Baden, who caused the fortifications to be razed. Ludwigshafen, originally only the *tête-du-pont* of Mannheim, received its present name in 1843, and became a town in 1859. Toward the end of last century Mannheim attained great celebrity in the literary world as the place where Schiller's early plays were performed for the first time. It was at Mannheim that Kotzebue was assassinated in 1819.

MANNING, ROBERT, commonly known as Robert of Brunne, a monk of the priory of Brunne, or Bourne, in Lincolnshire, wrote, in the beginning of the reign of Edward III., a metrical history of England from the landing of the imaginary Brute to the end of the reign of Edward I.

MONOMETER, or PRESSURE GAUGE, is an instrument for measuring the hydrostatic pressure exerted by gases, vapors, or liquids against the sides of the closed vessels in which they are confined—as, for instance, the pressure of steam in a steam-boiler.

MANOR, in English law, is an estate in land, to which is incident the right to hold certain courts called courts baron. It might be described as the unit of tenure under the feudal system, and it is historically connected with the territorial divisions of the mark and the parish or township.

MANRESA, a town of Catalonia, Spain, thirty-nine miles northwest of Barcelona, with a population of 15,264.

MANS, LE, a town of France, formerly capital of Maine and now of the department of Sarthe, lies 118 miles (131 by rail) west-southwest from Paris, near the confluence of the Sarthe and the Huisne, on an elevation rising from the left bank of the former river. Three bridges besides that of the railway connect the town with the quarter on the right bank. Of the wide and commodious thoroughfares which are gradually superseding the old winding and narrow streets, the most worthy of notice is the tunnel by which the Place des Jacobins is connected with the river side. The principal building is the cathedral, originally founded by St. Julian, to whom it is dedicated. The population is 50,175, (including 5,282 representing the garrison, etc.) Le Mans is an important railway junction.

MANSEL, HENRY LONGUEVILLE, metaphysician and theologian, was born at Cosgrove, Northamptonshire, England, in 1820, and died in 1871.

MANSFELD, COUNT ERNEST OF, a natural son of Peter Ernest, governor of Luxemburg and Brussels, was

born in 1585. Trained by his godfather, the archduke Ernest of Austria, in the Roman Catholic religion, he devoted himself to the service of the king of Spain in the Netherlands, and to that of the emperor in Hungary. He joined the Reformed Church, and in 1610 formally associated himself with the Protestant princes. From the outbreak of the Thirty Years' War in 1618 he fought steadily on behalf of the elector of the Palatinate both in Bohemia and in the Rhine country. In 1625 he was able to collect a powerful force, with which he intended to attack the hereditary territories of Austria, but, on April 25, 1626, he was defeated by Wallenstein at Dessau. He pressed forward to effect a junction with Bethlen Gabor, prince of Transylvania, but as the latter changed his policy Mansfield had no alternative but to disband his army. When preparing to go to England by Venice, he became ill at a village near Zara, and died on November 20, 1626.

MANSFIELD, a market-town in the county of Nottingham, England, is situated in Sherwood Forest, near the north bank of the river Mann or Maun, seventeen miles northwest from Nottingham, and 140 north-northwest of London by rail. Population (1890), 15,000.

MANSFIELD, the county seat of Richland county, Ohio, pleasantly situated on high ground, fifty-four miles south of Sandusky, in the midst of a prosperous farming district. It is the terminus of the Northwestern Ohio Railroad, and is at the junction of the Baltimore & Ohio, the Pittsburgh, Fort Wayne & Chicago, and the New York, Pennsylvania & Ohio lines. It possesses a flourishing trade, and extensive manufactories of agricultural implements, machinery, flour, boilers, carriages, and household furniture, with many minor industries. Mansfield has public water-works on the "Holly" system, a public library, and an opera-house. The population was 8,029 in 1870, and is now (1890) 13,473.

MANSFIELD, WILLIAM MURRAY, EARL OF, was born at Scone, in Perthshire, on March 2, 1705. In 1727 he took chambers in Lincoln's Inn, and in 1730 was called to the bar.

For two or three years he made little or no progress, but at length his appearance in some important Scotch appeal cases brought him into notice, and in Scotland at least he acquired an immense reputation by his appearance for the city of Edinburgh when it was threatened with disfranchisement for the affair of the Porteous mob. His English business had as yet been scanty, but in 1737 a single speech in a jury trial of note may be said to have placed him at the head of the bar, and from this time he enjoyed a great business. In 1738 he married Lady Elizabeth Finch, daughter of the earl of Winchelsea. His political career commenced in 1742 with his appointment as solicitor-general. He had kept entirely aloof during the struggles which preceded the fall of Sir Robert Walpole; he refused any purely political appointment, and only took office as solicitor when he felt assured of the permanence of the new administration. During the next fourteen years Murray was one of the most conspicuous figures in the parliamentary history of the time. In 1754 he became attorney-general, and for the next two years acted as leader of the House of Commons under the administration of the duke of Newcastle. But in 1756, when the government was evidently approaching its fall, an unexpected vacancy occurred in the chief justiceship of the king's bench, and he claimed the office. He was at the same time raised to the peerage as Baron Mansfield. In 1776 he was created earl of Mansfield. In 1783, although he declined to reënter the cabinet, he acted as speaker of the House of Lords during the coalition ministry, and with

this his political career may be said to have closed. He continued to act as chief justice until his resignation in June, 1788, and after five years spent in quiet retirement died peacefully on March 20, 1793.

MANSLAUGHTER. See MURDER.

MANSON, GEORGE, a Scottish water-color painter, was born in Edinburgh on December 3, 1850. In 1871 he devoted himself exclusively to painting. His subjects were derived from humble Scottish life—especially child life, varied occasionally by portraiture, by landscape, and by views of picturesque architecture. He died on February 27, 1876.

MANSUR, MANSOOR, or more properly, with the article, AL-MANSÚR, "the victorious," a surname assumed by not a few Mohammedan princes.

MANTEGNA, ANDREA, one of the chief heroes in the advance of painting in Italy, was born in 1431, in or near Padua, of very humble parentage. It is said that in his earliest boyhood Andrea was, like Giotto, put to shepherding or cattle-herding; but this can have lasted only a short while, as his natural genius for art developed with singular precocity. Successful and admired though he was in Padua, Mantegna left his native city at an early age, and never afterward resettled there. The rest of his life was passed in Verona, Mantua, and Rome—chiefly Mantua; Venice and Florence have also been named, but without confirmation. Died in 1506.

MANTELL, GIDEON ALGERNON, born in 1790 at Lewes, Sussex, England, rose to eminence as a popular exponent of geology, and contributed many original papers to the literature of the science. He died in 1852.

MANTINEIA was one of the most famous cities of Arcadia. It was situated in the long narrow valley running north and south, which is now called after the chief town, Tripolitza. Tegea was in the same valley, about ten miles south of Mantineia, and the two cities continually disputed the supremacy of the valley. In every great war we find them ranged on opposite sides, except when superior force constrained both. In the Peloponnesus the disputes between Argos and Sparta lasted for centuries, and Mantineia was always an ally of the former.

MANTIS. Probably no other insect has been the subject of so many and widespread legends and superstitions as the common "praying mantis," *Mantis religiosa*, L. The ancient Greeks endowed it with supernatural powers; the Turks and Arabs hold that it prays constantly with its face turned toward Mecca; the Provençals call it *Prega-Diou* (*Prie-Dieu*), and numerous more or less similar names—preacher, saint, nun, mendicant, soothsayer, etc.—are widely diffused throughout southern Europe. Children ask it to show them the way, and Mouffet assures us that it rarely or never deceives them; and it is even recorded that one specimen, which alighted on the hand of St. Francis Xavier, and which he commanded to sing the praise of God, loudly intoned a very beautiful canticle. In Nubia it is held in great esteem, and the Hottentots, if not indeed worshipping the local species (*M. fausta*), as one traveler has alleged, at least appear to regard its alighting upon any person both as a token of saintliness, and an omen of good fortune.

Yet these are "not the saints, but the tigers of the insect world." The front pair of limbs are very peculiarly modified—the coxa being greatly elongated, while the strong third joint or femur bears on its curved underside a channel armed on each edge by strong movable spines. Into this groove the stout tibia is capable of closing like the blade of a penknife, its sharp, serrated edge being adapted to cut and hold. Thus armed, with head raised upon the much-elongated and semi-erect prothorax, and with the half-opened fore-

limbs held outward in the characteristic devotional attitude, its rests motionless upon the four posterior limbs waiting for prey, or occasionally stalks it with slow and silent movements, finally seizing it with its knife-blades and devouring it. Although apparently not daring to attack ants, these insects destroy great numbers of flies, grasshoppers, and caterpillars, and the larger South American species even attack small frogs, lizards, and birds. They are very pugnacious, fencing with their sword-like limbs "like hussars with sabers," the larger frequently devouring the smaller, and the females the males. The Chinese keep them in bamboo cages, and watch them like fighting cocks.

MANTUA, a fortified city of Italy, the chief town of a province, the see of a bishop, and the center of a military district, lies ninety-five miles east-southeast of Milan, and twenty-five miles by rail south of Verona, occupying, at the height of eighty-eight feet above the level of the Adriatic, an almost insular site in the midst of the swampy lagoons of the Mincia, with their vast reaches of reeds and bulrushes. As the belt of marshy ground along the south side can be laid under water at pleasure, the site of the city proper, exclusive of the considerable suburbs of Borgo di Fortezza to the north and Borgo di San Giorgio to the east, may still be said to consist, as it formerly did more distinctly, of two islands separated by a narrow channel and united by a number of bridges. On the west side lies Lago Superiore, on the east side Lago Inferiore—the boundary between the two being marked by the *Argine del Mulino*, a long covered wooden bridge stretching northward from the northwest angles of the city. As approached from the north by the old road, Mantua presents a beautiful prospect with its "towers and walls and waters." The population increased from 26,687 in 1871 to 28,048 in 1889. As a fortress Mantua was long one of the most formidable in Europe, a force of 30,000 to 40,000 men finding accommodations within its walls; but it had two serious defects—the marshy climate told heavily on the health of the garrison, and effective sorties were almost impossible.

Mantua was originally an Etruscan town, and had still a strong Etruscan element in its population during the Roman period. It was a Roman municipium; but Martial calls it Little Mantua, and, had it not been for Virgil's interest in his native place and in the expulsion of a number of the Mantuans from their lands in favor of Octavian's soldiers, we should probably have heard almost nothing of its existence. Besides Virgil, Mantua counts among its celebrities Sordello the Provençal poet, Castiglioni, Folengo the writer of macaronics, and Pomponazzi the philosopher; and it has a long roll of local historians—Donesmondi (ecclesiastical affairs), Possevino, Daino, Amedei, Visi, Tonelli, and Count Carlo d'Arco.

MANUCODE, from the French, an abbreviation of *Manucodiata*, and the Latinized form of the Malay *Manukdewata*, the "bird of the gods," and a name applied for more than 200 years apparently to Birds-of-Paradise in general. In the original sense of its inventor, Montbeillard, *Manucode* was restricted to the King Bird-of-Paradise and three allied species; but in English it has curiously been transferred to a small group of species whose relationship to the *Paradiseida* has been frequently doubted, and must be considered uncertain.

MANUEL I., COMNENUS, emperor of Constantinople from 1143 to 1184, was the fourth son of John II. (Calo-Joannes), and was born about the year 1120. He succeeded to the imperial crown on April 8, 1143, having for his martial qualities been nominated by John to the inheritance in preference to his elder surviving brother. During his reign of thirty-seven years

he was involved in almost perpetual war, in which he displayed much more of the courage of a soldier than of the prudence and skill of a commander. Died in 1185.

MANUEL II., PALÆOLOGUS, emperor of Constantinople, was born in 1348, and succeeded his father, John VI. (with whom he had been associated since 1375), in 1391. At the time he was a hostage at the court of Bajazet at Nicæa, but succeeded in making his escape; he was forthwith besieged in Constantinople by the sultan, whose victory over the Christians at Nicopolis, however (September 28, 1395), did not secure for him the capital. Manuel subsequently set out in person to seek help from the West, and for this purpose visited Italy, France, and Germany, but without material success; the victory of Timur in 1402, and the death of Bajazet in the following year, were the first events to give him a genuine respite from Ottoman oppression. He stood on friendly terms with Mahomet I., but was again besieged in his capital by Amurath II. in 1422. He died in 1425, and was succeeded by his son, John VII.

MANUEL I., emperor of Trebizond, surnamed the Great Captain, was the second son of Alexius I., first emperor of Trebizond, and ruled from 1238 to 1263. Whatever may have been his military skill, or his personal character for bravery, he was unable to deliver his empire from vassalage first to the Seljuks and afterward to the Mongols. He was the founder of the church and monastery of St. Sophia at Trebizond. His predecessor was John I., Axuchus, and his eldest son, Andronicus II., succeeded him.

MANURE. The term "manure," though formerly applied only to the excrements of animals, either alone or mixed with straw, is now more widely used, and is given to all substances, or mixtures of substances, which are added to the soil in order to increase its productivity or to restore the natural fertility lost by repeated cropping.

The atmosphere is the great storehouse of organic plant-food. The carbonic acid always present in the air is, as is well known, eagerly taken up by the leaves of plants, all of which have the power of decomposing carbonic acid, giving off its oxygen and assimilating its carbon. Roughly speaking, three-fourths of the dry substance of all plants is derived from the atmosphere.

Under conditions of natural growth and decay, when no crops are gathered in, or consumed on the land by live stock, the herbage on dying down and decaying returns to the atmosphere and the soil the elements taken from them during life; but under cultivation a succession of crops deprives the land of the constituents which are essential to healthy and luxuriant growth. Without an adequate return to the land of the matters removed in the produce, its fertility cannot be maintained for many years. In newly-opened countries, where old forests have been cleared and the land brought into cultivation, the virgin soil often possesses at first a high degree of fertility, but gradually its productive power decreases from year to year. Generally speaking, it is more convenient to clear fresh forest land than to improve more or less exhausted virgin land by the application of manure, labor, and skill. In all densely peopled countries, where such a mode of cultivation cannot be followed, it is necessary to resort to artificial means to restore the natural fertility of the land and maintain and increase its productiveness.

The researches of Liebig, Wiegmann, Polstorff, and others have proved beyond doubt the important functions of the mineral constituents of the soil in relation to plant life. The gradual removal of phosphate of lime in the tillage of dairy districts, or the removal of

other mineral matters essential to the healthy growth of farm crops, certainly impoverishes the land. The exhaustion of the soil is caused in a much more marked way, however, by the rapid loss in available nitrogenous plant food which soils sustain when under cultivation without manure.

Agricultural improvements manifest themselves in two different directions—the mechanical and the chemical. Under mechanical improvement the physical condition of the soil is bettered and its latent stores of plant food brought into action by mechanical means, such as plowing, subsoiling, steam cultivation, etc. The introduction of new and superior agricultural implements, good systems of drainage, and intelligent division of labor characterize the first stage of progress in agriculture. The second stage is marked by the application of chemical principles to practical agriculture, an application shown by the introduction of a rational system of feeding, a proper rotation of crops, and chiefly the use of chemical or artificial manures for the purpose of restoring the natural fertility of the soil and increasing its productive powers.

The aid which chemistry has rendered during the last twenty-five or thirty years to practical agriculture has greatly promoted agricultural improvements; and farming, which is in large measure dependent for success upon an economical use of manures, is now being carried on much more rationally than in former times. The proper application of various kinds of manures is one of the most prominent features of successful modern farming.

In considering the economical use of manures on the land, regard must be had to the following points:—(1) the requirements of the crops intended to be cultivated; (2) the physical condition of the soil; (3) the composition of the soil; and (4) the composition of the manure. Briefly stated, the guiding principle of manuring economically and profitably is to meet the requirements of the crops intended to be cultivated, by incorporating with the soil, in the most efficacious states of combination, the materials in which it is deficient, or which the various crops usually grown on the farm do not find in the land in a sufficiently available condition to insure an abundant harvest.

Soils vary greatly in composition, and hence it will be readily understood that in one locality or on one particular field a certain manure may be used with great benefit, while in another field the same manure has little or no effect upon the produce. Although increased attention has of recent years been paid to the chemical composition and properties of soils, there is still much room left for improvement, for many farmers disregard altogether the composition of their fields in buying artificial manures.

The principal constituents of manures are—nitrogen, in the form of ammonia, nitrates and nitrogenous organic matters; organic matters not containing nitrogen (humus); phosphoric acid, potash, soda, lime, magnesia, silica, sulphuric acid, and chlorine. Of these constituents by far the most important are the nitrogen, phosphoric acid, and potash.

Farmyard manure is composed of the urine and solid excrements of animals collected in the stalls or yards, together with the straw used as litter. Its composition varies greatly, according to the quantity of straw used as an absorbent, the nature of the animals, the food they have consumed to produce it, the length of time it has been kept, etc.

Analysis shows that farmyard manure contains all the constituents, without exception, which are required by cultivated crops to bring them to perfection, and hence it may be called a perfect manure. Dung, it will be

observed, contains a great variety of organic and inorganic compounds of various degrees of solubility, and this complexity of composition—difficult, if not impossible, to imitate by art—is one of the reasons which render farmyard manure as perfect as well as a universal manure.

The excrements of different kinds of animals vary in composition, and those of the same animal will vary according to the nature and quantity of the food given, the age of the animal, and the way it is generally treated. Thus a young animal which is growing needs food to produce bone and muscle, and voids poorer dung than one which is fully grown and only has to keep up its condition. The solid and liquid excrements differ much in composition, for, while the former contains a good deal of phosphoric acid, lime, magnesia, and silica, and comparatively little nitrogen, the urine is almost destitute of phosphoric acid, and abounds in alkaline salts and nitrogenous organic matters, which on decomposition yield ammonia. Unless, therefore, the two kinds of excrements are mixed, a perfect manure supplying all the needs of the plant is not obtained; care must accordingly be taken to absorb all the urine by the litter. Farmyard manure, it is well known, is much affected by the length of time and the way in which it has been kept. Fresh dung is soluble in water only to a limited extent, and in consequence it acts more slowly on vegetation, and the action lasts longer than when dung is used which has been kept some time; fresh dung is therefore generally used in autumn or winter, and thoroughly rotten dung in spring, when an immediate forcing effect is required.

During the fermentation of dung a large proportion of the non-nitrogenous organic matters disappears in the form of carbonic acid and water, while another portion is converted into humic acids which effectually fix the ammonia gradually produced from the nitrogenous constituents of the solid and liquid excrements. The mineral matters remain behind entirely in the rotten dung, if care be taken to prevent loss by drainage.

Well-fermented dung, as is known to all agriculturists, is more concentrated and consequently more efficacious than fresh farmyard manure. Neither fresh nor rotten dung contains any appreciable quantity of volatile ammonia, and hence there is no necessity for applying gypsum, dilute acid, green vitriol, or other substances recommended as fixers of ammonia. If dung is carted out into the field and spread out at once it may be left for weeks together before it is plowed in without the slightest risk of sustaining loss in fertilizing matter by evaporation, for dung does not lose ammonia by evaporation on exposure to the air, and any mineral soluble salts will be washed into the soil where they are wanted. If, however, dung is kept for a length of time in shallow heaps, or in open straw-yards and exposed to rain, it loses by drainage a considerable proportion of its most valuable soluble fertilizing constituents.

MANUSCRIPTS, ANCIENT. See DIPLOMATICS and PALÆOGRAPHY.

MANUTIUS. I. ALDUS MANUTIUS. Teobaldo Mannucci, better known as Aldo Manuzio, the founder of the Aldine press, was born in 1450 at Sermoneta in the Papal States. He received a scholar's training, studying Latin at Rome under Gasparino da Verona, and Greek at Ferrara under Guarino da Verona. Having qualified himself for the career of a humanist, according to the custom of the century, he went in 1482 to reside at Mirandola with his old friend and fellow-student, the illustrious Giovanni Pico. There he stayed two years, prosecuting his studies in Greek literature. Before Pico removed to Florence, he procured for Aldo the post of tutor to his nephews Alberto and Lionello

Pio, princes of Carpi. To Alberto Pio the world owes a debt of gratitude, inasmuch as he supplied Aldo with funds for starting his printing press, and gave him lands at Carpi. It was Aldo's ambition to secure the literature of Greece from further accident by committing its chief masterpieces to type; and the history of his life is the record of the execution of this gigantic task. Aldo selected Venice as the most appropriate station for his labors. He settled there in 1490, and soon afterward gave to the world editions of the *Hero and Leander* of Musæus, the *Galeomyomachia*, and the Greek Psalter. These have no date; but they are the earliest tracts issued from his press, and are called by him "Precursors of the Greek Library."

At Venice Aldo gathered an army of Greek scholars and compositors around him. His trade was carried on by Greeks, and Greek was the language of his household. Instructions to type-setters and binders were given in Greek. The prefaces to his editions were written in Greek. Greeks from Crete collated MSS., read proofs, and gave models of calligraphy for casts of Greek type. Not counting the craftsmen employed in merely manual labor, Aldo entertained as many as thirty of these Greek assistants in his family. His own industry and energy were unremitting. In 1495 he issued the first volume of his Aristotle. Four more volumes completed the work in 1497-98. Nine comedies of Aristophanes appeared in 1498. Thucydides, Sophocles, and Herodotus followed in 1502; Xenophon's *Hellenics* and Euripides in 1503; Demosthenes in 1504. The troubles of Italy, which pressed heavily on Venice at this epoch, suspended Aldo's labors for awhile. But in 1508 he resumed his series with an edition of the minor Greek orators; and in 1509 appeared the lesser works of Plutarch, and in 1513 Plato.

These complete the list of Aldo's prime services to Greek literature. But it may be well in this place to observe that his successors continued his work by giving Pausanias, Strabo, Æschylus, Galen, Hippocrates, and Longinus to the world in first editions. Omission has been made of Aldo's reprints, in order that the attention of the reader might be concentrated on his labors in editing Greek classics from MSS. Other presses were at work in Italy; and, the classics issued from Florence, Rome, or Milan, Aldo took them up, bestowing, in each case, fresh industry upon the collation of codices and the correction of texts. Nor was the Aldine press idle in regard to Latin and Italian classics. For these Italian and Latin editions Aldo had the elegant type struck which bears his name. It is said to have been copied from Petrarch's handwriting, and was cast under the direction of Francesco da Bologna, who has been identified by Panizzi with Francia the painter.

Aldo's enthusiasm for Greek literature was not confined to the printing-room. He burned with a humanist's enthusiasm for books he printed, and we may well pause astonished at his industry, when we remember what a task it was in that age to prepare texts of authors so numerous and so voluminous from MSS. Whatever the students of this century may think of Aldo's scholarship, they must allow that only vast erudition and thorough familiarity with the Greek language could have enabled him to accomplish what he did. In his own days Aldo's learning won the hearty acknowledgment of ripe scholars. To his fellow workers he was uniformly generous, free from jealousy, and prodigal of praise. His stores of MSS. were as open to the learned as his printed books were liberally given to the public. While aiming at that excellence of typography which renders his editions the treasures of the book-collector, he strove at the same time to make them cheap. We may perhaps roughly estimate the

current price of his pocket series of Greek, Latin, and Italian classics, begun in 1501, at 50 cents per volume of our present money. Aldus Manutius died in 1515.

II. PAULUS MANUTIUS. By his marriage with Maria Torresano, Aldo had three sons, the youngest of whom, Paolo, was born in 1512, and died in 1574. In 1533 Paolo undertook the conduct of his father's business, which had latterly been much neglected. In the interregnum between Aldo's death and Paolo's succession (1514-33) the Asolani continued to issue books, the best of which were Latin classics. But, though their publications count a large number of first editions, and some are works of considerable magnitude, they were not brought out with the scholarly perfection at which Aldo aimed. Paolo determined to restore the glories of the house, and in 1540 he separated from his uncles. The field of Greek literature having been well-nigh exhausted, he devoted himself principally to the Latin classics. He was a passionate Ciceronian, and perhaps his chief contributions to scholarship are the corrected editions of Cicero's letters and orations, his own epistles in a Ciceronian style, and his Latin version of Demosthenes.

III. ALDUS MANUTIUS, JUNIOR. The younger Aldo, born in 1547, the year after his father Paolo's marriage, cradled in scholarship, and suckled as it were with printer's ink, proved what is called an infant prodigy. When he was nine years old, his name was placed upon the title page of the famous *Eleganze della lingua Toscana e Latina*. What his share was in that really excellent selection cannot be ascertained; but it is hardly possible that a boy of nine could have compiled it without assistance. The *Eleganze* was probably a book made for his instruction and in his company by his father. In 1561, at the age of fourteen, he produced a work upon Latin spelling, called *Orthographiæ Ratio*. During a visit to his father at Rome in the next year, he was able to improve this treatise by the study of inscriptions, and in 1575 he completed his labors in the same field by the publication of an *Epitome Orthographiæ*. Printing, in his case, as in the case of his father, went hand in hand with original authorship. About the year 1576, he was appointed professor of literature to the Cancelleria at Venice. The Aldine press continued through this period to issue books, but none of signal merit; and in 1585 Aldo determined to quit his native city for Bologna, where he occupied the chair of eloquence for a few months. In 1587 he left Bologna for Pisa, and there, in his quality of professor, he made the curious mistake of printing Alberti's comedy *Philodoxius* as a work of the classic Lepidus. Sixtus V. drew him in 1588 from Tuscany to Rome; and at Rome he hoped to make a permanent settlement as lecturer. But his public lessons were ill attended, and he soon fell back upon his old vocation of publisher under the patronage of a new pope, Clement VIII. In the tenth year of his residence at Rome, that is, in 1597, he died, leaving children, but none who cared or had capacity to carry on the Aldine press.

MANZONI, ALESSANDRO FRANCESCO TOMMASO ANTONIO, founder of the romantic school in Italian literature, was born at Milan, March 7, 1785. Manzoni's intellect was slow in maturing, and at the various colleges where his school days were passed he ranked among the dunces. At fifteen, however, he developed a passion for poetry, and wrote two sonnets of considerable merit. On the death of his father in 1805, he joined his mother at Auteuil, and spent two years there, mixing in the literary set of the so-called "ideologues," philosophers of the eighteenth century school, among whom he made many friends, notably Claude Fauriel. There too he imbibed the negative creed of Voltairianism, and only after his marriage, and under

the influence of his wife, did he exchange it for that fervent Catholicism which colored his later life.

Manzoni's marriage in 1808 to Henriette Blondel, daughter of a Genevese banker, proved a most happy one, and he led for many years a retired domestic life, divided between literature and the picturesque husbandry of Lombardy. In 1819 Manzoni published his first tragedy, *Il Conte di Carmagnola*, which, boldly violating all classical conventionalism, excited a lively controversy. It was severely criticised in the *Quarterly Review*, in an article to which Goethe replied in its defense, "one genius," as Count de Gubernatis remarks, "having divined the other." The death of Napoleon in 1821 inspired Manzoni's powerful stanzas *Il Cinque Maggio*, the most popular lyric in the Italian language. In 1822, Manzoni published his second tragedy, *Adelchi*, turning on the overthrow by Charlemagne of the Lombard domination in Italy, and containing many veiled allusions to the existing Austrian rule.

With these works Manzoni's literary career was practically closed. The end of the poet's long life was saddened by domestic sorrows. The loss of his wife in 1833 was followed by that of several of his children, and of his mother, to whom he was fondly attached. In 1837 he married his second wife, Teresa Borri, widow of Count Stampa, whom he also survived, while of nine children born to him in his two marriages, all but two preceded him to the grave. The death of his eldest son, Pier Luigi, on April 28, 1873, was the final blow which hastened his end; he fell ill immediately, and died of cerebral meningitis, May 22d, aged eighty-eight.

MAORIES. See NEW ZEALAND.

MAP. As each man stands in the center of his horizon and the portion of the earth's surface which lies within his range of vision has the appearance of a disk, the whole world was in ancient times conceived as a disk surrounded by the sea. It was consequently not uncommon for a people to imagine—as was the case we know with the Chinese, the Hindus, the Chaldeans, the Jews, the Arabs, and even the ancient Peruvians—that it occupied the middle part of the world. The wider a people's range of vision, the wider was the disk the world represented. A circular surface is thus the simplest form for a *mappa mundi* or map of the world; and it is met with both in antiquity and in the Middle Ages. The extent of the circle of vision depends among uncivilized peoples on their way of life. Wandering tribes have seen more of the world than settled tribes; and hunters, fishers, and seamen make the widest excursions. Among them, consequently, we find the beginnings of map-making; and Eskimo, Indians, and Polynesians, for example, show in this matter astonishing quickness of apprehension, while among the settled Negro tribes, on the other hand, there are no maps. A map drawn by an Eskimo woman enabled Sir Edward Parry to discover Fury and Hecla Straits; McClintock during his endeavors to clear up the fate of the Franklin expedition repeatedly got the Eskimo to draw coast maps of the Arctic lands.

Turning to civilized peoples, it is among the Egyptians that we find the earliest recorded examples of cartographic representation. Apollonius of Rhodes (born 230 B.C.) reports in his *Argonautica* that the Egyptians of Colchis, a colony dating from the time of Ramses II. (?), had preserved as heirlooms certain wooden tablets on which land and sea, roads and highways, were accurately indicated; Eustathius, in his commentary on Dionysius Periegetes, mentions that Sesostris the Egyptian king caused route maps to be prepared; and Strabo also refers to certain old maps in the library of Eratosthenes in which Meroe and the south end of the peninsula of India were placed on the same parallel of latitude.

These statements have been confirmed by the actual discovery of such maps and plans on old Egyptian papyrus rolls. Birch has, for instance, identified a drawing on a papyrus in the Turin Museum as the topographical map of a gold-mining district in Nubia. The ancient Babylonians have also the high distinction of having divided space and time in a way that allowed scientific measurements to be made after the still customary method. It was they who originated the division of the ecliptic into twelve signs and later into 360 degrees; and the division of the circle into 360 degrees with sixty minutes to the degree and sixty seconds to the minute, as well as the corresponding division of the hour, was the outcome of their sexagesimal system of numeration. This method of division was introduced among the Greeks by Hipparchus (150 B.C.), and obtained general currency through the geographer Ptolemy, (150 A.D.) By this means were provided the elements necessary for the astronomical determination of geographical position. Among the Egyptians and Babylonians map-making remained in its infantile stage; its scientific development was received at the hands of the Greeks.

The Romans contributed nothing to the development of the scientific method of the Greeks, and did not apply astronomy to the purposes of cartography.

The scholastic Middle Ages confined themselves to imitation of the Roman *orbes*. Fullness of detail, moreover, was gradually lost, meagerness and crudity appearing in its place. Cartography, in fact, fell back to a second childhood. The doctrine of the sphericity of the earth was placed under the ban of the church, and people went back to the Homeric idea of a disk surrounded by the ocean.

The nautical (loxodromic or compass) maps, which make their first appearance in Italy in the thirteenth century, indicate a gratifying improvement in cartography after a long period of stagnation. These maps were constructed with the aid of the compass, and took the name of compass maps because they are covered with the figure of a compass from which numerous straight lines radiate out in all directions over the sheet. The fact that the magnet turns toward the north is first mentioned in 1187. Flavio Gioja of Amalfi was perhaps the first to make a mariner's compass and to teach seamen the use of that important instrument. The courses of individual ships were first of all inserted as straight lines, calculated according to the distances traversed, from particular ports, as Genoa or Venice, to other ports, and when a good supply of such material had been collected and a series of diagonals drawn in accordance therewith, the most important points on the coast and in the islands were fixed. The lines by which the meridians were cut at the same angle were called loxodromes; they gave a correct indication when they cut the true astronomical meridian, a false one when they cut a magnetic meridian. On the Italian charts the loxodromes were drawn as straight lines. The numerous radii of the compass shown on the maps enabled the seaman to find the direction which he had to take to reach his goal. Hence the title loxodromic maps.

Charts on which the degrees were marked became necessary only when navigation extended to the ocean; they were introduced by the Portuguese, probably at the suggestion of Prince Henry the Navigator. They are "plane charts" with lines of longitude and latitude.

Ptolemy's great work, again, became generally well known in western Europe only after it was translated into Latin by Jacobus Angelus de Scarparia in 1409; and this version was first printed in 1475 at Vicenza without maps. The first edition with maps (to wit, a

map of the world, ten maps of Europe, four of Africa, and twelve of Asia) appeared at Rome in 1478. This edition was followed by a great many others. From this long series, which if prolonged to the beginning of the Thirty Years' War would be further increased by five, it is evident that Ptolemy was the great master of the modern time. At first maps were drawn according to Ptolemy's determinations of geographical position; but, in proportion as the study of mathematics, astronomy, and cosmography excited the interest of men of culture, opportunities were afforded of correcting Ptolemy's astronomical positions, especially in the case of central and northern Europe, where the range of the great cosmographer's knowledge had hardly enabled him to collect original material. The new arts of wood and copper engraving supplied the means for a rapid diffusion of *printed* maps. The oldest map printed from a wooden block (in the National Library at Paris), dating from 1460, and thus belonging to the earliest period of wood engraving, was produced in Germany, and represents Germany and western Europe. It is considered to be a copy from an old Roman map.

After the foundations of trigonometry had been laid by Purbach, Regiomontanus, and others, attempts of a rather rude kind were made in the beginning of the sixteenth century to execute geographical triangulations and delineations. The towns formed the central points of the system, their direction and position from the post of observation being fixed as precisely as possible, and their distance estimated in miles according to the best available data without being accurately measured. It was considered sufficient to assign in this way the relative position of inhabited places, and the representation of the physical relations was very superficial; the course of rivers, for instance, was not measured, but carried past the towns on their banks in conventional lines.

Gerhard Kramer, usually called Mercator (born of German parents at Rupelmonde, in Flanders, in 1512), has the honorable place of a reformer of cartography. We possess his map of Palestine (1537), a map of Flanders (Louvain, 1540) in nine sheets, phototyped in 1882, a globe (1541), and the first critical map of Europe (1554), by which he laid the foundation of his fame as the first cartographer of his age. The exclusive use of Latin letters for maps in Germany was due to his example. Especially famous is his map of the world dating from 1569. By 1601 Mercator's projection was in use for all sea charts. In 1578 Mercator drew up maps for Ptolemy exactly in accordance with his determinations; and these were followed by maps of Germany, the Low Countries, and France (1585), and of Italy (1590). It was his purpose to produce a complete collection of new maps, to which he gave the name *Atlas*; but he died in 1594, and the publication of this first atlas (1595) was left to his son.

A series of important discoveries in mathematics, physics, and astronomy having provided the means of making much more accurate observations and calculations, there followed as a matter of course a substantial improvement in cartography. Of chief moment were the invention of the telescope (1606), Galileo's discovery of Jupiter's moons (1610), and Cassini's calculation of their periods of rotation, so important for determination of longitude (1666), the first application of trigonometry to geodesy by Snellius (1615), Picard's measurement of a degree between Paris and Amiens (1669 and 1670), the French measurement of a degree between Dunkirk and Perpignan by Cassini and Lahire (1683-1718), Hadley's mirror-sextant (1731; according to Newton's idea, 1699), the improvements made on the lunar tables by Tobias Mayer (1753), and John Harrison's chronometer (1761). In this way there set in a

period of transition in cartography which lasted till somewhere about 1750; the results of new investigations and measurements were gradually turned to account, but, while here and there traditional blunders were corrected and expunged, nothing essentially new was as yet created.

Up to this point the whole art of map-making had been treated as a matter of private speculation. It was France that gave the first example of carrying out the cartographic survey of the country at the cost of the state. Such surveys had a double object, one military, to provide the army with satisfactory maps, and the other administrative, to furnish a cadastre for the land tax. The military interest predominated; consequently the surveys have in almost all countries been carried out by officers of the general staff, and the maps are briefly designated as general staff or ordnance maps. For such a survey the whole country is covered with a network of triangles, and, in order to secure the most trustworthy basis for the representation, numerous points are astronomically fixed. In comparison with those maps of earlier date the maps thus produced are distinguished by correctness of detail. Outside of Europe there are but few countries in which a survey based on exact triangulation has been carried out. The largest areas thus measured are the United States of America and British India, where great activity has been shown; and to these may be added Asiatic Russia, portions of Australia, portions of the Dutch possessions in the East Indies, and Algeria.

MAP, MAPES, or MAPUS, WALTER, an ecclesiastical statesman and renowned wit of the twelfth century, must be ranked among the greatest of English writers, though French was the language that he used, and his personal fame has long been lost in the splendor of his creations. He was the cosmogonist and one of the principal creators of the Round Table legends, which supplied the ideal of chivalrous life to so many succeeding centuries. Most of the facts that are known about his position in the world have been gathered from a gossiping anecdotal work of his in Latin, *De Nugis Curialium*.

MAPLE. Maples and the sycamore are species of *Acer*, suborder *Acerineæ*, order *Sapindaceæ*. The genus includes about fifty species, natives of Europe, North America, North Asia, especially the Himalayas and Japan. Maples are for the most part trees with palmately-lobed leaves. The flowers are in corymbs or racemes—the lowermost mostly male, the terminal bisexual. The fruit is a two-winged "samara."

The earliest known maples occur in the Miocene strata of Oeningen, where nineteen species have been discovered—a greater number than occurs in any one district at the present day.

North American Species.—*A. saccharinum*, L., the sugar, rock, or birdseye maple. It sometimes attains to seventy or even one hundred feet, more commonly fifty to sixty feet. It is remarkable for the whiteness of the bark. The wood is white, but acquires a rosy tinge after exposure to light. The grain is fine and close, and when polished has a silky luster. The timber is used instead of oak where the latter is scarce, and is employed for axletrees and spokes, as well as for Windsor chairs, etc. It exhibits two accidental forms in the arrangement of the fibers—an undulated one like those of the curled maple (*A. rubrum*), and one of spots, which gives the name birdseye to the wood of this species. Like the curled maple, it is used for inlaying mahogany. It is much prized for bedsteads, writing-desks, shoe-lasts, etc. The wood forms excellent fuel and charcoal, while the ashes are rich in alkaline principles, furnishing a large proportion of the potash exported from Boston and New York. Sugar is princi-

pally extracted from this species, the sap being boiled and the syrup when reduced to a proper consistence run into molds to form cakes. Trees growing in low and moist situations afford the most sap but least sugar. A cold northwest wind, with frosty nights and sunny days in alternation, tends to incite the flow, which is more abundant during the day than the night. A thawing night is said to promote the flow, and it ceases during a southwest wind and at the approach of a storm; and so sensitive are the trees to aspect and climatic variations that the flow of sap on the south and east side has been noticed to be earlier than on the north and west side of the same tree. The average quantity of sap per tree is from fourteen to twenty-four gallons in a season.

A. rubrum, L., the red-flowering or scarlet maple, is a middle-sized tree. It is the first tree to blossom in spring in North America. The wood, like that of other species, is applicable to many purposes, as for the seats of Windsor chairs, turnery, etc. The grain in very old trees is sometimes undulated, which suggested the name of curled maple, and gives beautiful effects of light and shade on polished surfaces. The most constant use of curled maple is for the stocks of fowling, pieces and rifles, as it affords toughness and strength combined with lightness and elegance. The inner bark is dusky red. On boiling, it yields a purple color which with sulphate of iron affords a black dye. The wood is inferior to that of the preceding species in strength and as fuel. Sugar was made from the sap by the French Canadians, but the production is only half as great as that from the sugar maple.

MAR, EARLDOM OF. Mar, one of the ancient divisions or provinces of Scotland, comprised the larger portion of Aberdeenshire, extending from north of the Don southward to the Mounth. It is remarkable for its association with the oldest historical dignity of Scotland, or perhaps of any country, which has been perpetuated to our own time.

MARABOUT is a corruption of the Arabic *Marābit*, a Moslem name for a hermit or a devotee. Primarily the word is derived from *ribāt*, a fortified frontier station. To such stations pious men betook them to win religious merit in war against the infidel; their leisure was spent in devotion, and the habits of the convent superseded those of the camp. Thus *ribāt* came to mean a religious house or hospice. The great sphere of the marabouts is North Africa. They are liberally supported by alms, direct all popular assemblies, and have a decisive voice in intertribal quarrels and all matters of consequence.

MARACAIBO, a city and seaport of Venezuela, the capital of the state of Zulia (formerly Maracaibo), lies about twenty-five miles from the sea on the west bank of Lake Maracaibo. The prosperity of the place is due to the fact that it forms the outlet for the produce of a wide region; and if the bar at the mouth of the lake, preventing the entrance of vessels drawing more than ten or eleven feet, were removed Maracaibo would bid fair to become the chief mercantile center of the north coast of South America. Coffee, not of prime quality, cocoa, and hides are the principal exports at present. The population is estimated at 30,000.

MARAGHA, a town of Persia, province Azerbaijan, sixty-eight miles from Tabriz, 232 northwest of Teheran, pleasantly situated in a long narrow valley opening toward Lake Urumiah, which lies ten miles to the northwest. Population (1890), 15,000.

MARANHÃO, or MARANHAM (Latinized as *Maragnanum*), in full form SAO LUIZ DE MARANHÃO, the chief town of the province of Maranhão in Brazil, is situated on the west side of an island of the same name twenty-eight miles long and fifteen broad. Though

built on so hilly a surface that carriages cannot be used, it is laid out with regularity, and has straight, wide, and clean-looking streets. The population of the island Maranhão is 34,023, about 30,000 belonging to the city.

MARAT, JEAN PAUL, was the eldest child of Jean Paul Mara of Cagliari and Louise Cabrol of Geneva, and was born at Boudry, in the principality of Neuchâtel, on May 24, 1743. His father was a doctor of some learning, who had abandoned his country and his religion, and had married a Swiss Protestant. It was he that laid the basis of the young Jean Paul's scientific learning, and the son at the same time imbibed the doctrines of Rousseau. On his mother's death in 1759 he set out on his travels, and spent two years at Bordeaux in the study of medicine, whence he moved to Paris, where he made use of his knowledge of his two favorite sciences, optics and electricity, to subdue an obstinate disease of the eyes. After some years in Paris he went to Holland, the retreat of philosophers, where all the works of the Encyclopedists were printed for the French market, and then on to London, where he settled in Church Street, Soho, a fashionable district, and practiced his profession. In 1773, at the age of thirty, he made his first appearance as an author with a *Philosophical Essay on Man, being an Attempt to Investigate the Principles and Laws of the Reciprocal Influence of the Soul on the Body*, of which only two volumes are extant, though at the end of the second volume he speaks of a third. The book shows a wonderful knowledge of English, French, German, Italian, and Spanish philosophers, and directly attacks Helvetius, who had in his *L'Esprit* declared a knowledge of science unnecessary for a philosopher. Marat, as he now began to call himself, declares that physiology alone can solve the problems of the connection between soul and body, and proposes the existence of a nervous fluid as the true solution. In 1774 he published a political work, *The Chains of Slavery*, which appeared without his name, and was intended to influence constituencies to return popular members, and reject the king's friends, with innumerable examples from classical and modern history of the ways in which kings enslaved their peoples. The book was too late to have any influence on the general election, and was got up in a style too costly for a wide circulation, but its author declared later that it procured him an honorary membership of the patriotic societies of Carlisle, Berwick, and Newcastle. He remained devoted to his profession, and in 1775 published in London a little *Essay on Gleans*, price 1s. 6d., of which no copy is to be found, and in Amsterdam a French translation of the first two volumes of his *Essay on Man*. In this year, 1775, he visited Edinburgh, and on the recommendation of certain Edinburgh physicians, was, on June 30, made an M.D. of St. Andrew's University. On his return to London he published an *Enquiry into the Nature, Cause, and Cure of a Singular Disease of the Eyes*, with a dedication to the Royal Society. In the same year there appeared the third volume of the French edition of the *Essay on Man*, which reached Ferney, and exasperated Voltaire, by its onslaught on Helvetius, into a sharp attack, that only made the young author more conspicuous. His fame as a clever doctor was now great, and on June 24, 1777, the Comte d'Artois, afterward Charles X. of France, "owing to the report he had heard of the good and moral life, and of the knowledge and experience in the art of medicine, of J. P. Marat," made him by brevet physician to his guards, with 2,000 livres a year and allowances.

Marat was soon in great request as a court doctor among the aristocracy; and even Brissot, in his *Mémoires*, admits his influence in the scientific world of

Paris. The next years were much occupied with scientific work, especially the study of heat, light, and electricity, on which he presented memoirs to the Académie des Sciences, but the Academicians were horrified at his temerity in differing from Newton, and, though acknowledging his industry, would not receive him among them. His experiments greatly interested Benjamin Franklin, who used to visit him; and Goethe always regarded his rejection by the Academy as a glaring instance of scientific despotism. In 1780 he had published at Neuchâtel without his name a *Plan de Législation Criminelle*, founded on the humane principles established by Beccaria. In April, 1786, he resigned his court appointment. The results of his leisure were in 1787 a new translation of Newton's *Optics*, and in 1788 his *Mémoires Académiques, ou Nouvelles Découvertes sur la Lumière*.

His scientific life was now over, his political life was to begin; in the notoriety of that political life his great scientific and philosophical knowledge was to be forgotten, the high position he had given up denied, and he himself to be scoffed at as an ignorant charlatan, who had sold quack medicines about the streets of Paris, and been glad to earn a few sous in the stables of the Comte d'Artois. In 1788 the notables had met, and advised the assembling of the states-general. The elections were the cause of a flood of pamphlets, of which one, *Offrande à la Patrie*, was by Marat, and, though now forgotten, dwelt on much the same points as the famous brochure of the Abbé Siéyès. When the states-general met, Marat's interest was as great as ever, and in June, 1789, he published a supplement to his *Offrande*, followed in July by *La Constitution*, in which he embodies his idea of a constitution for France, and in September by his *Tableau des Vices de la Constitution d'Angleterre*, which he presented to the assembly. Marat, who had lived in England, had seen that England was at this time being ruled by an oligarchy using the forms of liberty, which, while pretending to represent the country, was really being gradually mastered by the royal power. His heart was now all in politics; and, feeling that his energies needed a larger scope than occasional tracts afforded, he decided to start a paper. At first appeared a single number of the *Moniteur patriote*, followed on September 12th by the first number of the *Publiciste parisien*, which on September 16th took the title of *L'Ami du Peuple*, and was to absorb his future life.

The life of Marat now becomes part of the history of the French Revolution. From the beginning to the end he stood alone. He was never attached to any party; the tone of his mind was to suspect whoever was in power; and, therefore, no historian has tried to defend him, and all state the facts about him with a strong coloring.

The suspicious tone of his mind extended to his paper, and he made it play the part of the lion's mouth at Venice; whoever suspected anyone had only to denounce him to the *Ami du Peuple*, and the denounced was never let alone till he was proved innocent or guilty. He began by attacking the most powerful bodies in Paris—the Corps Municipal, with Bailly at their head, and the court of the Châtelet—and after a struggle found them too strong for him, and fled to London (January, 1790). There he wrote his *Denonciation contre Necker*, and in May dared to return to Paris and continue the *Ami du Peuple*. He was embittered by persecution, and continued his vehement attacks against all in power—against Bailly, against La Fayette, and at last, after the day of the Champs du Mars, against the king himself. All this time he was hiding in cellars and sewers, where he was attacked by

a horrible skin disease, tended only by the woman Simonne Evrard, who remained true to him. The end of the constituent assembly he heard of with joy, and with bright hopes (soon dashed by the behavior of the legislative) for the future, when, almost despairing, in December, 1791, he fled once more to London, where he wrote his *École du Citoyen*. In April, 1792, summoned again by the Cordeliers, he returned to Paris, and published No. 627 of the *Ami*. The war was now the question, and Marat saw clearly enough that it was not sought for the sake of France, that it was to serve the purposes of the Royalists and the Girondins, who thought of themselves alone. Marat, like Danton, foresaw the massacres of September. After the events of August 10th he took his seat at the commune, and demanded a tribunal to try the Royalists in prison. No tribunal was formed, and the massacres in the prisons were the inevitable result. In the elections to the convention, Marat was elected seventh out of the twenty-four deputies for Paris, and for the first time took his seat in an assembly of the nation. At the declaration of the republic, he closed his *Ami du Peuple*, and commenced a new paper, the *Journal de la République Française*, which was to contain his sentiments as its predecessor had done, and to be always on the watch. In the assembly Marat had no party; he would always suspect and oppose the powerful, but refuse power for himself. After the battle of Valmy, Dumouriez was the greatest man in France; he could almost have restored the monarchy, yet Marat did not fear to go uninvited to the tragedian Talma's, and there accuse Dumouriez in the presence of his friends of want of patriotism. His unpopularity in the assembly was extreme, yet he insisted on speaking on the question of the king's trial, declared it unfair to accuse Louis of anything anterior to his acceptance of the constitution, and, though implacable toward the king, as the one man who must die for the people's good, he would not allow Malesherbes, the king's counsel, to be attacked in his paper, and speaks of him as a "sage et respectable vieillard." The king dead, the months from January to May were spent in an unrelenting struggle between Marat and the Girondins. Marat depised the ruling party because they had suffered nothing for the republic, because they talked too much of their feelings and their antique virtue, because they had for their own purposes plunged the country into war; while the Girondins hated Marat as a representative of that rough red republicanism which would not yield itself to a Roman republic, with themselves for tribunes, orators, and generals. The Girondins conquered at first in the convention, and ordered that Marat should be tried before the Tribunal Revolutionnaire. But their victory ruined them, for Marat was acquitted on April 24th, and returned to the convention with the people at his back. Their fall was a veritable victory for Marat. But it was his last. The skin disease he had contracted in the subterranean haunts was rapidly closing his life; he could only ease his pain by sitting in a warm bath, where he wrote his journal, and accused the Girondins, who were trying to raise France against Paris. Sitting thus on July 13th he heard in the evening a young woman begging to be admitted to see him, saying that she brought news from Caen, where the escaped Girondins were trying to rouse Normandy. He ordered her to be admitted, asked her the names of the deputies then at Caen, and, after writing their names, said, "They shall be soon guillotined," when the young girl, whose name was CHARLOTTE CORDAY (q.v.), stabbed him to the heart.

Humanity has united to execrate Marat, as the embodiment of unrelentless cruelty and causeless crime.

He is spoken of as a moral monster and gibbeted with Nero and Caligula, while his slayer is classed with Judith as the rightful avenger of the wrongs of a whole people. But it is certain that Marat was a man of great attainments and of irreproachable honesty. A charitable view of his character is that which imputes his savage slaughter of those whom he declared to be enemies of the Republic, to a mind unhinged.

MARATHON was a plain on the northeast coast of Attica, containing four villages—Marathon, Probalinthos, Tricorythos, and Oinoe, which formed a tetrapolis. It was divided from the plain of Athens by Mount Pentelicus and the hilly district of Diacria, and was, in the early period, an autonomous state. After it became incorporated in the Attic state, it retained something of its original distinctive character. The worship of Apollo had its first home in Attica here, and it was carried hence to Athens when the tetrapolis was made part of the Athenian commonwealth. The district was one of the chief seats of the worship of Hercules, and boasted that it was the first place where he had been worshiped as a god. Hence legend localized here several events in the story of the Heraclidæ, and especially the self-sacrifice of Macaria, daughter of Hercules. The legend of Theseus was also known in the district; here the hero slew the Marathonian bull. The plain derived its name chiefly from the battle in which the Athenians and Plataeans under Miltiades defeated the Persians, 490 B.C. The 192 Athenians that were slain were buried on the field of battle, contrary to the usual Attic custom, and a mound, which is still called Soro, was erected over them. Another tumulus covered the bodies of the slain Plataeans and slaves, and a special monument was raised to Miltiades.

MARBLE is a term applied to any limestone which is sufficiently close in texture to admit of being polished. Many other ornamental stones—such as serpentine, alabaster, and even granite—are sometimes loosely designated as marbles, but by accurate writers the term is invariably restricted to those crystalline and compact varieties of carbonate of lime which, when polished, are applicable to purposes of decoration. The crystalline structure is typically shown in statuary marble. A fractured surface of this stone displays a multitude of facets, which are rhombohedral cleaving planes of the component grains. On placing a thin section of Carrara marble under the microscope, it is seen that each grain is an imperfect crystal, or crystalloid, of calc-spar, having an irregular boundary, and being itself made up of a number of crystalline plates twined together. As marble appears to be, in many cases, a metamorphic rock, it is probable that pressure and heat have been the principal natural agents concerned in the alteration of compact into crystalline limestones.

Among statuary marbles the first place may be assigned to the famous Pentelic marble, the material in which Phidias, Praxiteles, and other Greek sculptors executed their principal works. The characteristics of this stone are well seen in the Elgin marbles, which were removed from the Parthenon at Athens, and are now in the British Museum. The marble was derived from the quarries of Mount Pentelicus in Attica. The Venus de' Medici is a notable example of work in Parian marble. Carrara marble is better known than any of the Greek marbles, inasmuch as it constitutes the stone employed by the best sculptors of the present day. This marble occurs abundantly in the Apuan Alps, an offshoot of the Apennines, and is largely worked in the neighborhood of Carrara, Massa, and Serravezza. Stone from this district was employed in Rome for architectural purposes in the time of Augustus, but the finer varieties, adapted to the needs of the sculptor, were

not discovered until some time later. It is in Carrara marble that the finest works of Michelangelo and of Canova are executed. The purest varieties of this stone are of snow-white color and of fine saccharoidal texture. Perhaps the most generally useful marbles yielded by the Carboniferous system are the black varieties, which are largely employed for chimney-pieces, vases, and other ornamental objects. The color of most black limestone is due to the presence of bituminous matter, whence the mineralogical name anthraconite.

The brown and yellow colors which stalagmitic marbles usually present are due to the presence of oxide of iron. This coloring matter gives special characteristics to certain stones, such as the *giallo antico*, or antique yellow marble of the Italian antiquaries. Siena marble is a reddish mottled stone obtained from the neighborhood of Siena in Tuscany; and a somewhat similar stone is found in King's County, Ireland. True red marble is by no means common, but it does occur, of bright and uniform color, though in very small quantity, in the Carboniferous limestone of Derbyshire and northeast Staffordshire, England. Fire marble is the name given to a brown shelly limestone containing ammonites and other fossil shells, which present a brilliant display of iridescent colors, like those of precious opal.

America possesses some valuable deposits of marble, which in the eastern States have been extensively worked. The crystalline limestones of western New England furnish an abundance of white and gray marble, while a beautiful material fit for statuary work has been quarried near Rutland in Vermont. A gray bird's-eye marble is obtained from central New York, and the grayish clouded limestones of Thomaston in Maine have been extensively quarried. Of the variegated and colored marbles, perhaps the most beautiful are those from the northern part of Vermont, in the neighborhood of Lake Champlain. A fine brecciated marble is found on the Maryland side of the Potomac, below Point of Rocks. Among the principal localities for black marble may be mentioned Shoreham in Vermont and Glens Falls in New York. In Canada the crystalline limestones of the Laurentian series yield beautiful marbles.

MARBLEHEAD, a town and port of entry in Essex county, Mass., is situated on the coast, seventeen miles by rail northeast of Boston, and four miles southeast of Salem, and communicates by two branch lines with the main line of the Eastern Railway. It is built on a rocky peninsula of about 3,700 acres in extent, which juts out into Massachusetts Bay, and has a deep, roomy, and nearly land-locked harbor. The fisheries in which Marblehead was once largely engaged have declined; but shoemaking has become an important industry, and the town is rising into favor as a summer resort. Many of the houses date from the "colonial" period, and one of the churches was built in 1714, but in the summer of 1877 nearly the whole business part of the town was burnt to the ground. The population was 7,703 in 1880, and is now (1890), 8,202.

Marblehead was incorporated in 1649. Of the original settlers, a considerable number were from the Channel Islands, and their peculiarities of speech continued for a long time to affect the local dialect. As at that period the second town of Massachusetts in wealth and size, Marblehead sent 1,000 men to the War of Independence, and its privateers rendered excellent service; but its trading prosperity never recovered from the effects of the contest. Elbridge Gerry, vice-president of the United States in 1812, was born at Marblehead; and the town is the scene of the grim revenge celebrated, with considerable poetical license, in Whitier's *Skipper Ireson's Ride*.

MARBURG, an ancient university town of Prussia, in the province of Hesse-Nassau and district of Cassel, is very picturesquely situated on the slope of a hill on the right bank of the Lahn, fifty miles to the north of Frankfort-on-the-Main, and about the same distance to the southwest of Cassel. The hill on which the town lies is crowned by the extensive old schloss, a fine Gothic building, the most noteworthy parts of which are the rittersaal, dating from 1277-1320, and the beautiful little chapel. Population (1890), 12,000.

MARBURG, the second town of the Austrian duchy of Styria, is very picturesquely situated on both banks of the river Drave, in a plain called the Pettauer-Feld, at the base of the well-wooded Bachergebirge. It is the seat of the bishop of Lavant, and of the judicial and administrative authorities of the district, and contains a gymnasium, a "realschule," an episcopal seminary, a normal school, a pomological school, a theater, and three hospitals. Population (1890), 20,000.

MARCANTONIO, or to give him his full name, **MARCANTONIO RAIMONDI**, is celebrated as the chief Italian master of the art of engraving in the age of the Renaissance. The date of his birth is uncertain.

MARCASITE. Modern mineralogists have restricted this name to those forms of native bisulphide of iron which crystallize in the orthorhombic system, and are sometimes known as "prismatic iron pyrites." By the older mineralogists the word was used with less definite meaning, being applied to all crystallized and radiated pyrites, whether rhombic or cubic.

MARCELLINUS, Sr., according to the Liberian catalogue, became bishop of Rome on June 30, 296; his predecessor was Caius or Gaius.

MARCELLUS, **MARCUS CLAUDIUS**, Roman warrior, was born about 268 B.C., and served first in Sicily against Hamilcar. In his first consulship (222) he was engaged in the war against the Insubres, and won the *spolia opima* by slaying their chief Viridomarus. In his last consulship (208), while both consuls were reconnoitering near Venusia, they were unexpectedly attacked, and Marcellus was killed.

MARCELLUS, **M. CLAUDIUS**, was curule ædile in 56 B.C. with P. Clodius. In 52 he spoke on behalf of Milo at his trial. In 51 he was consul with Ser. Sulpicius. During his consulship he proposed to remove Cæsar from his army from March, 49. After Pharsalus M. Marcellus retired to Mytilene. He made no attempt to return, till in 46 the senate appealed to Cæsar. Marcellus accepted this favor reluctantly. Pressed by Cicero, he left Mytilene for Italy, but was murdered in May by Magius Cilo in the Piræus.

MARCELLUS, **M. CLAUDIUS**, son of C. Marcellus and Octavia, sister to Octavianus, was born about 43 B.C. Octavianus adopted him and made him pontifex and senator with prætorian rank. In 25 he married Julia, daughter of Octavianus, and was looked on as his future successor. Yet in a dangerous illness Augustus gave his signet to Agrippa. Differences arising, Agrippa was made proconsul of Syria to separate the rivals. In 23 Marcellus, while curule ædile, fell ill and died at Baiæ.

MARCELLUS I., pope, succeeded Marcellinus, after a considerable interval, most probably in May 307; under Maxentius he was banished from Rome in 309 on account of the tumult caused by the severity of the penances he had imposed on Christians who had lapsed under the recent persecution. He died the same year, being succeeded by Eusebius.

MARCELLUS II., Marcellus Cervini, cardinal of Santa Croce, a native of the Mark of Ancona, was elected pope in the room of Julius III. on April 9, 1555, but died on the twenty-first day after his election. His successor was Paul IV.

MARCH, the third month of our modern year, contains thirty-one days. As in the Roman year so in the English ecclesiastical calendar used till 1752 this was the first month, and the legal year commenced on March 25th. The Romans called this month *Martius*, from the god Mars; and it received the name *Illyd Monath*, i.e., loud or stormy month, from the Anglo-Saxons. In France March was also generally reckoned the first month of the year until 1564, when, by an edict of Charles IX., January was decreed to be thenceforth the first month. Scotland followed the example of France in 1599; but in England the change did not take place before 1752.

MARCHE, a former province of central France, was bounded on the north by Berri, on the northeast by Bourbonnais, on the east by Auvergne, on the south by Limousin, and on the west by Angoumois and Poitou, embracing the greater part of the modern department of Creuse, a considerable portion of Haute-Vienne, and fragments of Charente and Indre. It derived its name from the circumstance of its being the "mark" or boundary between Poitou and Berri; it is sometimes referred to as Marche Limousin.

MARCHENA, a town of Spain, in the province of Seville, lies in a sandy valley, not far from the Corbones, a tributary of the Gaudalquivir, about thirty miles east-southeast from Seville. The population is 14,000.

MARCIAN (**MARCIANUS**), emperor of the East from 456 to 457, was born in a private station of life in Illyria or Thrace, about the year 391, and at an early age entered the army, where after a considerable term of obscurity he attracted the attention of Ardaburius and subsequently of Aspar, being made military secretary and a captain in the guards. He maintained the peace of his dominions during the troubles which convulsed the Western empire in 455; and in 456 his arms were free to repress disturbances in Lazica which had been fomented by the Armenians and Persians. He died in 457, and was succeeded by Leo I.

MARCION, AND THE **MARCIONITE CHURCHES**. In the period between 130 and 180 A.D., the varied and complicated Christian fellowships in the Roman empire crystallized into close and mutually exclusive societies—churches with fixed constitutions and creeds, schools with distinctive esoteric doctrines, associations for worship with peculiar mysteries, and ascetic sects with special rules of conduct. Of churchly organizations the most important, next to Catholicism, was the Marcionite community. Like the Catholic church, this body professed to comprehend everything belonging to Christianity. It admitted all believers without distinction of age, sex, rank, or culture. It was no mere school for the learned, disclosed no mysteries for the privileged, but sought to lay the foundation of the Christian community on the pure gospel, the authentic institutes of Christ. The pure gospel, however, Marcion found to be everywhere more or less corrupted and mutilated in the Christian circles of his time. His undertaking thus resolved itself into a reformation of Christendom. When he died is not known; but his death can scarcely have been much later than the year 165.

The main outlines of his teaching are as follows: Man is, in spirit, soul, and body, a creature of the just and wrathful God. This God created man from Hyle (matter), and imposed on him a strict law. Since no one could keep this law, the whole human race fell under the curse, temporal and eternal, of the Demiurge. Then a higher God, hitherto unknown, and concealed even from the Demiurge, took pity on the wretched, condemned race of men. He sent his Son (whom Marcion probably regarded as a manifestation of the supreme

God Himself) down to this earth in order to redeem men. Clothed in a visionary body, in the likeness of a man of thirty years old, the Son made His appearance in the fifteenth year of Tiberius, and preached in the synagogue at Capernaum. But none of the Jewish people understood Him. Even the disciples whom He chose did not recognize His true nature, but mistook Him for the Messiah promised by the Demiurge through the prophets, who as warrior and king was to come and set up the Jewish empire. The Demiurge himself did not suspect who the stranger was; nevertheless he became angry with Him, and, although Jesus had punctually fulfilled his law, caused Him to be nailed to the cross. By that act, however, he pronounced his own doom. For the risen Christ appeared before him in His glory, and charged him with having acted contrary to his own law. To make amends for this crime, the Demiurge had now to deliver up to the good God the souls of those who were to be redeemed; they are, as it were, purchased from him by the death of Christ. Christ then proceeded to the underworld to deliver the spirits of the departed. It was not the Old Testament saints, however, but only sinners and malefactors who obeyed His summons. Then, to gain the living, Christ raised up Paul as His apostle. He alone understood the gospel, and recognized the difference between the just God and the good. Accordingly, he opposed the original apostles with their Judaistic doctrines, and founded small congregations of true Christians. But the preaching of the false Jewish Christians gained the upper hand; nay, they even falsified the evangelical oracles and the letters of Paul. Marcion himself was the next raised up by the good God, to proclaim once more the true gospel. This he did by setting aside the spurious gospels, purging the real Gospel (the Gospel of Luke) from supposed Judaizing interpolations, and restoring the true text of the Pauline epistles. He likewise composed a book, called the *Antitheses*, in which he proved the disparity of the two gods, from a comparison of the Old Testament with the evangelical writings.

The golden age of the Marcionite churches falls between the years 150 and 250. During that time they were really dangerous to the great church; for in fact they maintained certain genuine Christian ideas, which the Catholic church had forgotten. From the beginning of the fourth century they began to die out in the West; or rather they fell a prey to Manichæism. In the East also many Marcionites went over to the Manichæans; but there they survived much longer. They can be traced down to the seventh century, and then they seem to vanish. But it was unquestionably from Marcionite impulses that the new sects of the Paulicians and Bogomiles arose; and in so far as the western Katharoi, and the antinomian and anti-clerical sects of the thirteenth century are connected with these, they also may be included in the history of Marcionitism.

MARCO POLO. See POLO.

MARCUS, the successor of Pope Sylvester I., according to the Liberian catalogue, had a pontificate of eight months and twenty days, from January 18 to October 7, 336. Of his character or history nothing is recorded. He was succeeded by Julius I.

MÁRDÍN, a town of Turkish Kurdistan, the seat of a governor dependent on the pasha of Diarbekir, is situated about sixty miles southeast of Diarbekir. Population, 18,000.

MARGARET OF ANJOU, who became the queen of Henry VI. of England, was born at Pont à Mousson in Lorraine, on March 24, 1429. In April, 1445, Margaret crossed the Channel, and was received by Henry on her landing at Portchester. A few days later, April 22d, they were married in Tichfield Abbey, or, as some

other authorities say, at Southwick, and on Sunday, May 30th, Margaret was crowned at Westminster. War broke out with France in 1449, and in the course of a single year the whole of Normandy was lost to the English. Suffolk was impeached by the Commons, and the king was persuaded that the best way to protect him was to order him to quit the country. But he was taken and murdered at sea, and for some time the country was in a state of fearful anarchy. Margaret's position was now one that required great tact and delicacy. The king's marriage was already unpopular, and the fact was soon manifest that his wife possessed far higher abilities and greater power of governing than himself. This, together with the king's occasional attacks of mental imbecility, was really the great source of her misfortunes. Civil war at last broke out, and Somerset fell at St. Albans in 1455. Party feeling was bitterly exasperated, and Margaret, as we learn from a contemporary French historian, actually instigated an attack on Sandwich by the French, out of hatred to the duke of York. At length, in 1460, that nobleman openly challenged the crown as his right, and obtained from parliament, with the consent of Henry himself, a settlement of the succession in his favor. Margaret's friends took up her cause in the north of England, and the duke of York, going to meet them, fell at the battle of Wakefield, December 30, 1460. The earl of March, however, soon came up and entered London, where he was proclaimed king by the name of Edward IV., amid the shouts of the citizens, who had always been devoted to his father. Margaret then thought it advisable to withdraw into the north along with Henry and her son, and Edward and Warwick pursued them into Yorkshire, where the bloody battle of Towton (March 29, 1461,) utterly crushed for the time the hopes of the house of Lancaster. Henry and Margaret fled to Scotland and surrendered Berwick to the Scots as the price of their assistance. Margaret and her son soon after entered England with a body of Scots, who besieged Carlisle, but they were driven back by Lord Montague. Then King Henry accompanied another invasion into the county of Durham, which was equally unsuccessful. Next year (1462) Margaret sailed from Kirkcudbright to seek aid in France, and offered the surrender of Calais to Louis XI. if Louis enabled her husband to regain his kingdom. On the total failure of this expedition the well-known story is told by a French writer of her wandering with her son in a forest where she was attacked by robbers, and appealing successfully to the loyalty of one of them to save the son of his king.

Soon after, in April, 1463, she sailed to Flanders and sought the aid of Philip of Burgundy, but he declined to do more than relieve her poverty. But in 1470, when her old enemy the earl of Warwick, having rebelled against King Edward, sought a refuge in France, Louis XI. induced her, though with great difficulty, to pardon him and concert measures along with him for her husband's restoration to the throne. The negotiation was cemented by an agreement for the marriage of her son, the prince of Wales, to the earl's daughter after the kingdom should be recovered, and so successful was the project that Edward was actually driven into exile, and for a period of six months Henry was again acknowledged as king. But the return of King Edward and the battle of Barnet once more changed the aspect of affairs before Margaret was able to rejoin her husband, and when she at length landed again in England she was defeated and taken prisoner at Tewkesbury. To add to her misery her only son Prince Edward was butchered after the battle. Four years later, in 1475, on peace being made between England and France, she was ransomed by Louis XI.,

and returned to her native country. She died at Dampierre near Saumur, in Anjou, on August 25, 1482.

MARGARET OF AUSTRIA, duchess of Savoy, and regent of the Netherlands from 1507 to 1530, was the daughter of the emperor Maximilian and Mary of Burgundy, and was born at Brussels on January 10, 1480. She died at Mechlin in 1530.

MARGARET OF AUSTRIA, duchess of Parma, and regent of the Netherlands from 1559 to 1567, was a natural daughter of Charles V. by Margaret van Gheenst, a Flemish lady, and was born at Brussels in 1522. Before her death, which occurred at Ortona in 1586, she had the satisfaction of seeing her son Alexander Farnese appointed to the government which she had occupied some twenty years before.

MARGARET, St., queen of Scotland, born in Hungary about 1040, was a daughter of Edward the Atheling, son of Edmund Ironside. She became the wife of Malcolm Canmore in the spring of 1069. She survived her husband, who died in November, 1093, by only a few days.

MARGARET, known in Scottish history as the "Maid of Norway," was, through her mother, Margaret, who had been married to Eric of Norway, the only grandchild of Alexander III. of Scotland, and was born in Norway in 1283. While she was still an infant, Edward I. of England arranged for her betrothal to his son, but this policy was defeated by her early death, which took place, it was alleged, in Orkney, as she was on her way to Scotland, in 1290.

MARGARET OF VALOIS. See MARGUERITE.

MARGARITA, an island in the Caribbean Sea, about eight miles off the coast of Venezuela, constituting along with the lesser islands Blanquilla and Hermanos the new state of Nueva Esparta. It has an area of 400 square miles. Pompatar is the only harbor, Pueblo del Norte and Pueblo de la Mar being rather open roadsteads. Asuncion, the chief town, contains about 3,000 inhabitants. The population of this island was 16,200 in 1807 (about 8,000 being whites), and that of the state 30,983 in 1873.

MARGARITA, St., virgin and martyr, is celebrated by the Church of Rome on July 20th, but her feast formerly fell on the 13th, and her story is almost identical, even in the proper names, with that of the Greek St. Marina (July 17th).

MARGATE, a municipal borough, market-town, and watering-place of Kent, England, is situated in the Isle of Thanet, four miles west of North Foreland, and by rail ninety miles east of London, with which it has also in summer daily steam communication by water. The population of the municipal borough in 1881 was 15,889.

MARGHILAN, Baber's MARGHINAN, now the administrative center of the Russian province of FERGHANA (*q.v.*), a very old town, with high earthen walls and twelve gates, commanded by the fort of Yar Mazar, lies in a beautiful and extraordinarily fertile district of the same name, irrigated by canals from the Shalimar-dán river. The heat in summer is excessive. Population, about 40,000, chiefly Usbeg.

MARGUERITE DE VALOIS. The name Marguerite was common in the Valois dynasty, and during the sixteenth century there were three princesses, all of whom figure in the political as well as in the literary history of the time, and who have been not infrequently confounded.

I. MARGUERITE D'ANGOULÊME. This, the most celebrated of the Marguerites, bore no less than four surnames. She was born at Angoulême on April 12, 1492, and was two years older than her brother Francis I. She was betrothed early to Charles, Duke d'Alen-

çon, and married him in 1509. She became a widow in 1525. In 1527 she married Henri d'Albret, titular king of Navarre. Marguerite was one of the chief patronesses of letters that France possessed, and the chief refuge and defender of advocates of the Reformed doctrines. Marguerite died in 1549.

II. The second MARGUERITE (1523-1574), daughter of Francis I., married the duke of Savoy in 1559. She is noteworthy as having given the chief impulse at the court of her brother Henry II. to the first efforts of the Pléiade.

III. The third MARGUERITE, called more particularly Marguerite de Valois, was great-niece of the first and niece of the second, being daughter of Henry II. by Catherine de' Medici. She was born in 1553. Marguerite exhibited during her life, which was not a short one, the strange Valois mixture of licentiousness, pious exercises, and the cultivation of art and letters, and died in 1615. She is the "Reine Margot" of anecdotic history and romance.

MARIA THERESA, archduchess of Austria, queen of Hungary and Bohemia, and empress of Germany, was the daughter of the emperor Charles VI. of Austria, and was born in Vienna on May 13, 1717. By the Pragmatic sanction of 1713, a settlement which was guaranteed by the principal states of Europe, her father had regulated the succession in the imperial family; and in 1724 accordingly, after the death of the archduke Leopold, her only brother, she was publicly declared sole heiress of the Austrian dominions. In 1736 she married Francis Stephen of Lorraine, who in the following year became grand duke of Tuscany; and on October 20, 1740, she came to the throne, her husband (emperor in 1745) being declared co-regent. The events of her reign have been briefly summarized under AUSTRIA and HUNGARY. She died at Vienna on November 29, 1780.

MARIANA, JUAN DE, a celebrated Spanish historian, was born at Talavera de la Reina in 1536, and died in 1624.

MARIAZELL, a village in the duchy of Styria, Austria, with about 1,200 inhabitants, is very picturesquely situated in the valley of the Salza, amid the Styrian Alps. Its entire claim to notice lies in the fact that it is the most frequented sanctuary in Austria, being visited annually by about 100,000 pilgrims. The object of veneration is a miracle-working image of the Virgin, carved in lime-tree wood, and about eighteen inches high. This was presented to the place in 1157.

MARIE ANTOINETTE, JOSEPH JEANNE, queen of France, was the fourth daughter of Maria Theresa and the emperor Francis I., and was born on November 2, 1755, on the day of the great earthquake at Lisbon, and in the year in which the hereditary policy of enmity between the houses of France and Austria was changed to an alliance between them. From her earliest years she was destined by her mother to sustain this alliance, and was educated, with a view to a marriage with a French prince, by the Abbé de Vermond, who was to have a great influence on her future life. In 1770 Choiseul negotiated her marriage to the young dauphin, which took place on May 16th with the greatest pomp, but which was overshadowed by a terrible accident in Paris at the fête given in honor of the marriage. The dauphine soon found her position very difficult; she was but fourteen, and was intended by her mother to support the Austrian alliance and Choiseul at the court of France. She had hardly arrived at Paris, when her friend and the friend of the Austrian alliance, Choiseul, was dismissed from the ministry, and she was left alone to steer a difficult course by the advice of the Austrian minister, the Count

de Mercy-Argenteau, whose reports of her daily doings to Maria Theresa have been published. In May, 1774, Louis XV. died, and Marie Antoinette became queen of France. Through the first years of her reign she played a very important political part, but, except, as in the cases of Poland and the Bavarian succession, when her mother pressed her to maintain the alliance, she chiefly exerted her influence with regard to individuals, not to measures or policies. This political rôle of hers, which was more than suspected, made her intensely unpopular to the French people, and this feeling was increased by her social mistakes. Her extravagance in dress and her passion for the card-table had greatly incensed and disgusted her mother; and, when her mother's death removed her only frank and bold adviser, she became more extravagant and more frivolous than ever. Her passion for play, her love of amusement, her intimacy with the Polignacs and their wild and dissipated society, her night visits to masked balls in Paris, and her favors to many officers of her guards and young foreigners at her court were the subject of ribald conversation in every coterie of Paris. The scandal of the diamond necklace, in which the queen was not to blame, spread her name with infamy all over France as if she had been guilty; and among the people her extravagance was regarded as a potent cause of their poverty and want. Such was her unpopularity when the states-general met in May, 1789; she was believed to be debauched and dissipated, when her real faults were that she was frivolous and careless of public opinion, Austrian at heart, though queen of France, and opposed to Necker as she had been to Turgot, and to all the reforms and economies her husband, Bonhomme Louis, was willing to institute. From July 14th onward Marie Antoinette headed the party of reaction and armed opposition to the Revolution, and became unwittingly the means of her husband's unpopularity and downfall; for she always had influence enough to prevent his carrying out the frank, honest policy of reform which he desired, but not enough to make him adopt hers in its stead, and is to blame for his vacillations in decisive moments. Left to himself, Louis might have been a reforming king like Charles III. of Spain.

She inspired the collection of foreign troops round Paris, contrary to the king's desire, and thus brought on the taking of the Bastille. She was present at the banquet at Versailles which caused the march of the women to Versailles and the transference of the royal family to Paris. When there, she still looked forward to undoing all that had been done, and would never frankly recognize her position. When brought into negotiation with Mirabeau, she refused to trust him or deal frankly with him. Had she done so, she might possibly have established a strong constitutional government, but she would not have been the self-willed Marie Antoinette. He advised her to go with the king and royal family to some provincial capital, declare the royal adherence to all the early acts of the assembly, but declare also that its later acts were passed under constraint, and were null and void; but she must not do two things—she must not fly toward the frontier, else she would be suspected of seeking foreign aid, and she must not depend on the army, but the people. She would not act while Mirabeau was alive—she was too independent to act by anyone's advice; but when he was dead she did what he had advised her not to do, fled toward the frontier and to Bouillé's army. The royal family were stopped at Varannes, and brought back to Paris, and from that time were regarded as traitors to France. She had yet two more chances. She might have thrown herself

into the hands of Barnave, Duport, and the constitutional party of the constituent assembly, who were ready to rally round their constitutional king, but she would not trust them or take their advice. When she was at the end of her power, when the Tuileries had been stormed, and she was in prison, and the republic proclaimed, Dumouriez was ready, after his victory of Valmy, to turn his army on Paris, dissolve the Jacobins, and reestablish the old constitution, but she would not trust him. It was her last chance. When once the republic was proclaimed it was evident that Louis must die both to cement its foundations and to remove a dangerous center of reaction; and in January, 1793, Marie Antoinette became a widow, never to the last recognizing that she had sacrificed her husband to her obstinacy and self-will. Harrowing descriptions have been given of her treatment in prison during the few remaining months of her life, but, though she was separated from her children, she had every material comfort, no less a sum than 1,110 livres being spent on her food alone between August and October, at the rate of fifteen livres a day. At last her trial came on—a mock trial indeed, as all those of the time, for her execution was determined before she came before the tribunal. Much has been said of the shameful charges made against her; but shameful as they were, they were based on a confession made by her son, which, though probably forced from him and utterly false, was yet put in evidence. The trial was soon over, and on the same day, October 16, 1793, she was guillotined.

MARIE DE FRANCE is one of the most interesting figures in the literary history of the Middle Ages. She is also one of the most mysterious. Nothing is known of her except from her own statements, which amount to little more than that her name was Marie and her country France, that she dedicated one of her works to an unnamed king, and another to a certain Count William. She is mentioned by Denis Pyramus, who was her contemporary, and who says that she was very popular, but gives no particulars.

MARIENBAD, one of the prettiest and most frequented watering-places on the Continent of Europe, with a station on the Kaiser Franz Josephs Railway, lies in a pleasant valley in the district of Tepl, in the northwest of Bohemia, about eighteen miles south of Carlsbad.

MARIENBURG, the chief town of a circle in the district of Dantzic, Prussia, lies thirty miles to the southeast of Dantzic, in a fertile plain on the right bank of the Nogat, a channel of the Vistula, here spanned by a handsome railway bridge and by a bridge of boats. Population, 10,000.

MARIETTA, the capital of Washington county, Ohio, lies on the right bank of the Ohio, at the mouth of the Muskingum, eighty-five miles southeast of Columbus, and is the eastern terminus of the Marietta and Cincinnati Railroad, and the southern terminus of the Cleveland and Marietta Railroad. The surrounding country being rich in petroleum, iron, and coal, the city has become the seat of no inconsiderable industry in the shape of oil-works, iron foundries, and machine-shops, a rolling-mill, tanneries, and carriage, car, bucket, and chair factories. Population (1890 census), 8,273.

MARIETTE, AUGUSTE FERDINAND FRANÇOIS, was born on February 11, 1821. Educated at the Boulogne municipal college, he distinguished himself in geometry, physics, chemistry, history, Latin, Greek, and English. He also evinced a remarkable talent for art. In 1839, when but eighteen years of age, he went to England in the capacity of professor of French. In 1845 his cousin, Nestor L'Hôte, the friend and fellow-traveler of Champollion, died; and upon Auguste Mariette devolved the

pious task of sorting the multitudinous papers of the deceased savant. The young man henceforth became passionately interested in Egyptology, devoted himself to the study of hieroglyphs and Coptic, and in 1847 published a *Catalogue Analytique* of the Egyptian Gallery of the Boulogne Museum. He had now found his vocation, and in 1849, being appointed to a subordinate position in the Louvre, left Boulogne for Paris. Intrusted shortly after with a Government mission for the purpose of seeking and purchasing Coptic, Syriac, Arabic, and Ethiopic MSS. for the national collection, he started for Egypt in 1850. Soon after his arrival he made his celebrated discovery of the ruins of the Serapeum and the subterraneous catacombs of the Apis-bulls, buried for probably some 2,000 years under the sands of the Libyan desert. He remained in Egypt for four years, excavating, discovering, and dispatching archaeological treasures to the Louvre, of which museum he was, on his return, appointed an assistant conservator. In 1858, by permission of his own government, he accepted the position of conservator of Egyptian monuments to the ex-khedive, Ismail-Pasha, and so removed with his family to Cairo. His history thenceforth becomes a chronicle of unwearied exploration and brilliant success. The pyramid-fields of Memphis and Sakkara, and the necropolises of Meydum, Abydos, and Thebes were ransacked for sepulchral treasures; the great temples of Denderah and Edfoo were disinterred, and, with their tens of thousands of inscriptions and bas-reliefs, restored to the light of day; important excavations were carried out at Karnak, Medinet-Habu, and Deir-el-Bahari; Tanis (the Zoan of the Bible) was partially explored in the Delta; and even Gebel Barkal in the far Soudan was made to yield monuments of the Ethiopic kings. The Sphinx was also bared to the rock-level, and the famous granite and alabaster monument mis-called the "Temple of the Sphinx" was discovered. In the meanwhile Mariette, raised successively to the rank of bey and then of pasha, had founded the "École Française d'Égyptologie" and the "Institut Égyptien," and created *ab ovo* the museum at Bulak, the richest and by far the most interesting Egyptian collection in the world. Honors and orders were showered upon him. In 1873 the Academy of Inscriptions decreed to him the great biennial prize of 20,000 francs, and in 1878 he was elected a member of the Institute. He was also an honorary member of most of the learned societies of Europe. Though of herculean strength and indomitable energy, he was not proof against over-work of all kinds, physical, mental, and official. Prostrated in 1877 by a first attack of the insidious malady from which only death released him, he lingered for a few years, working to the last, and died at Cairo, January 19, 1881.

MARIGNOLLI, GIOVANNI DE', a notable traveler to the far East of the fourteenth century, born probably prior to 1290, and sprung from a notable family in Florence, is supposed to have died in 1357.

MARIGOLD. This name has been given to several plants, of which the following are the best known: *Calendula officinalis*, L., the pot-marigold; *Tagetes erecta*, L., the African marigold; *T. patula*, L., the French marigold; and *Chrysanthemum segetum*, the corn marigold. All these belong to the order *Compositæ*; but *Caltha palustris*, L., the marsh marigold, a ranunculaceous plant.

The first-mentioned is the familiar garden plant with large orange-colored blossoms, and is a native of the meadows of southern Europe. It is unisexual, the "ray" florets being female, the "disk" florets male. This and the double variety have been in cultivation for at least 300 years, as well as a proliferous form, *C.*

prolifera, or the "fruitful marigold" of Gerard, in which small flower-heads proceed from beneath the circumference of the flower.

Chrysanthemum segetum, L., the yellow corn marigold, is indigenous to Great Britain, and is frequent in corn-fields in most parts of England. A decoction of the fresh plant gathered before flowering is acrid, and is said to be useful medicinally. When dried it has been employed as hay. It is also used in Germany for dyeing yellow.

Caltha palustris, L., the marsh marigold, the "winking Mary-buds" of Shakespeare, is a common British plant in marshy meadows and beside water.

MARINES. With all maritime nations, especially if they be insular and capable of taking the offensive in war, there must frequently be cases in which naval operations can be supplemented by the landing of a force. The armament, equipment, and discipline of the armies and navies of such nations were in early days practically alike. But with the introduction of more regular levies and better organization arose the necessity for having on board ships-of-war an armed body organized to meet the altered condition of things. Sailors were but engaged for periods during which ships were commissioned; and their previous history and training did not tend to furnish the material required. Regular armies on shore called for disciplined forces afloat—that is to say, for marines, or sea-soldiers, who should have the steadiness of the troops of the line, be accustomed to the peculiar duties of ship life, and be subordinate to the naval authorities.

America alone employs marines in the same manner as England; they have won, as their British comrades have, the approbation of the naval authorities and, on nineteen occasions, the thanks of Congress. Admiral Farragut's opinion that "the marine guard is one of the great essentials of a man-of-war" is corroborated by that of Admiral Wilkes, who considered that "marines constituted the great difference between a man-of-war and a privateer." Formed in 1775 for the "public defense," they rank as the oldest force in the American service; and since that time they have shared in land and sea operations in all parts of the world. In the famous battles between the *Bonhomme Richard* and *Serapis* in 1777, and in that between the *Chesapeake* and *Shannon*, they displayed brilliant gallantry; and while on the one hand they at Derne in 1803 first planted the American flag on a fortress of the Old World, for which exploit "Tripoli" is inscribed on their colors, they on the other shared in the hard fighting of the Mexican war as well as all the important coast actions of the civil war of 1861-65. A proposal to incorporate them with the army after the struggle met with universal condemnation from the authorities best qualified to judge of their value. At present they number seventy-eight officers and 2,000 men under the command of a commandant, who ranks as brigadier-general, with headquarters at Washington. Their administration, organization, and equipment are, as in England, identical with those of the soldiers of the line. They are enlisted for five years, must be five feet six inches in height, between eighteen and thirty-five years of age, and able to read and write. The complement on board ship varies from thirteen to fifty-one officers and men, depending on the rating of the vessel.

MARINETTE, a Wisconsin town, in Marinette county, lies on Green Bay, at the mouth of the Menominee river. The principal industry of the town is the lumber trade. It is situated near the Michigan line, in the midst of a lumbering region. It has banks, churches, schools, telegraphs, and railroad connection. Population (1890), 11,523.

MARINI, or MARINO, GIAMBATTISTA, Italian poet, was born at Naples in 1569, and died in 1625.

MARINUS I. (MARTINUS II.) succeeded John VIII. in the pontificate about the end of December, 882. On three separate occasions he had been employed by the three popes who preceded him as legate to Constantinople, his mission in each case having reference to the controversy excited by Photius. Among his first acts as pope were the restitution of Formosus, cardinal bishop of Porto, and the anathematizing of Photius. He died in May or June, 884, his successor being Adrian III.

MARINUS II. (MARTINUS III.), pope from 942 to 946, was preceded by Stephen IX., and followed by Agapetus II.

MARION, FRANCIS, American general, was born in 1732 at Winyah, near Georgetown, S. C. In 1759-61 he served as lieutenant in expeditions against the Cherokees, and in 1775 he was elected a member of the provincial congress of South Carolina. This voted two regiments of infantry, and Marion was elected captain in the second. He was made lieutenant-colonel after the defense of Fort Moultrie at the entrance of Charleston harbor (June 28, 1776), and was present at the unsuccessful attack on Savannah, September, 1779. In August he joined Gates, but was detached a few days before Gates' defeat at Camden on August 16th; at Nelson's Ferry, on the 20th, he rescued 150 of the prisoners from a strong guard. He soon received a general's commission. Pursued by Tarleton and Wemyss, he was driven to North Carolina, but soon returned. After successful skirmishes against superior forces, he formed a camp at Snow's Island, in the midst of the swamps of the Pedee and the Santee. In March, 1781, he defeated Watson at Black river; but meanwhile Doyle had destroyed Marion's camp. In April Lee and Marion took Fort Watson, and in May Fort Motte. In June Greene detached Sumter with Marion and others to make an incursion into the low country. At Quinby Marion's men fought well against Coates; and in August he made a forced march to Parker's Ferry and rescued Colonel Harden, pressed by a superior force. At Eutaw Springs he commanded the right under Greene. After the British retreat to Charleston, Marion went to an important session of the colonial assembly; on the very day that he returned to his brigade, February 24, 1782, it was surprised and dispersed, Marion arriving too late to recover the day. After the war he occupied himself with farming. He died February 27, 1795.

MARION, an Indiana town, in Grant county, of which it is the capital, lies on the Mississinewa river. It has some manufactures and several machine-shops and foundries, together with banks, schools, churches, and newspapers. It is a railroad and telegraph center. Population (1890), 8,769.

MARION, an Ohio town, the capital of Marion county, lies at the junction of several railroads, from which fact it derives its chief importance. It has extensive manufactures, mostly of agricultural implements, carriages, machinery, etc. The town has banks, schools, and churches. It also has several newspapers. It is a telegraph center, and is steadily growing. Population (1890), 8,327.

MARIONETTES are figures, generally below life-size, suspended by threads or wires and imitating with their limbs and heads the movements of living persons.

The high antiquity of puppets appears from the fact that figures with movable limbs have been discovered in the tombs of Egypt and among the remains of Etruria; they were also common among the Greeks, from whom they were imported to Rome. Plays in which the characters are represented by puppets or by the shadows of

moving figures, worked by concealed performers who deliver the dialogue, are not only popular in India and China at the present day, but during several centuries past maintained an important position among the amusements of the people in most European countries. Goethe and Lessing deemed them worthy of attention; and as late as 1721 Le Sage wrote plays for puppets to perform. Everyone remembers in Don Quixote "the curious puppet show, which represents the play of Melisandra and Don Gayferos, one of the best shows that has been acted time out of mind in this kingdom." Reference to puppet shows is frequent in English literature from Chaucer onward.

MARIOTTE, EDME, a celebrated French physicist, was a native of Burgundy. He lived chiefly near Dijon as prior of St. Marton sous Beaune, and was one of the first members of the Academy of Sciences, which was founded at Paris in 1666. He died at Paris May 12, 1684.

MARITIME LAW. See SEA LAWS.

MARITIME PROVINCE (Russian, *Primorskaya Oblast*), a province of the Russian empire, and part of the general-governorship of Eastern Siberia, is a strip of territory which extends along the Siberian coast of the Pacific from Corea to the Arctic Ocean, and also includes the peninsula of KAMCHATKA (*q.v.*), the island of Saghalien or Sakhalin, and several small islands scattered along the coast. Its western boundary stretches northward from the Korean town of Kinghing by Lake Khangka and along the Usuri, keeping to the eastward of the hilly tracts and prairies of northern Manchuria; it then follows an imaginary line which runs due north from the mouth of the Usuri to the bay of Udskey, separating the province from the lowlands and mountain wildernesses of the Amur province; it next runs along the Stanovoy watershed between the Pacific and the Arctic Ocean, leaving to the west the elevated tracts of the Siberian plateau, and finally it crosses the spurs of this plateau through barren *tundras* belonging to Yakutsk, reaching the Arctic Ocean at the Chaunskaya Bay. The province has a length of 2,300 miles and a width varying from 40 to 420 miles; it covers an area of 730,000 square miles, and exhibits very great varieties of climate, scenery, and population.

MARIUPOL, a seaport of Russia, on the northern shore of the Sea of Azoff, at the mouth of the Kalmius, in the government of Ekaterinoslav, fifty-five miles west of Taganrog. It is connected by a branch railway with the line between Kharkoff and Taganrog, and is situated on the highway between the latter town and the Crimea. Population, 10,000.

MARIUS, CAIUS, is one of the most striking figures in Roman history. Born the son of a small farmer at Arpinum (Arpino), the birthplace also of Cicero, in 155 B.C., he worked his way up from this humble origin, in spite of the most determined opposition from the senate and the aristocracy, to the highest position in the state, was seven times consul, and was spoken of as a third Romulus and a second Camillus. He began life as a soldier, and first saw war in Spain under the great Scipio Africanus, whose good opinion he won, and so rose from the ranks to be an officer. Marius achieved some important success over Jugurtha, and had shown that he was the man to settle a tiresome guerrilla war, and when he was a little over fifty, in 107 B.C., he was, amid great popular enthusiasm, elected consul for the first time. In the following year, in conjunction with his future political rival, Sulla, he brought the war to a triumphant issue, and passed two years in his province of Numidia, which he thoroughly subdued and annexed to Rome's dominion.

By this time Marius was generally recognized as the

ablest general of the day, and in face of the great peril now beginning to threaten Rome from the north of the Alps, where an immense multitude of Cimbri and Teutones were hanging on the borders of Italy, public opinion promptly summoned him to the chief command. Two armies had been utterly destroyed in the neighborhood of the Lake of Geneva, and it seemed as if a repetition of the disaster of Allia in 390 B.C., and the capture of Rome itself, might be not impossible. Marius, out of unpromising materials and a demoralized soldiery, organized a well-disciplined army, with which he inflicted on the invading hordes two decisive defeats, the first in 102 B.C. at Aquæ Sextiæ (Aix in the department of Bouches du Rhône, some way north of Marseilles), and the second in the following year at Vercellæ (Vercelli, about midway between Turin and Milan), the result being that for a period of some centuries Rome had nothing to fear from the northern barbarians. Deservedly indeed was Marius elected consul a fifth time, hailed as the "savior of his country," and honored with a triumph of unprecedented splendor.

The really glorious part of his career was now over, and the remainder of his life is associated with the worst cruelties and horrors of civil war, revolution, and proscription. The hideous strifes of Marius and Sulla have passed into a proverb. Marius was appointed in 88 B.C., after a riot and partial revolution, to the command in the war in the East with Mithridates, but the triumph of Sulla and the aristocratical party almost immediately afterward drove him as an outlaw from Rome, and he had to seek safety amid the marshes round Minturnæ (Garigliano) in Latium. The Gallic trooper sent by the local authorities to strike off the old man's head quailed, it is said, before the fire of his eye, and fled. Meantime, in the absence of Sulla, who had left Italy for the Mithridatic war, Cinna's sudden and violent revolution had put the senate at the mercy of the popular leaders, and Marius greedily caught at the opportunity of a bloody vengeance, which became in fact a reign of terror in which senators and nobles were slaughtered wholesale. He had himself elected consul, for the seventh time, in fulfillment of a prophecy given to him in early manhood. Thus, full of honors in one sense, but really hated and execrated, he closed his career, dying in the delirium of fever in 86 B.C., aged seventy.

MARIVAUX, PIERRE CARLET DE CHAMBLAIN DE, novelist and dramatist, was born at Paris in 1688, and died in 1763.

MARK, the traditional name of the author of the Second Gospel. The name Mark occurs in several books of the New Testament. In the Acts of the Apostles, chap. xii., mention is made of "John whose surname is Mark," to the house of whose mother, Mary, at Jerusalem, Peter went when miraculously released from prison. This John Mark went with Barnabas and Paul on their missionary journey, as far as Perga in Pamphylia, and then, "departing from them, returned to Jerusalem." On the subsequent history of Mark the Acts of the Apostles are silent.

MARK, GOSPEL OF. See GOSPELS.

MARKIRCH, a flourishing industrial town of Germany, in Upper Alsace, circle of Rappoltswiler, is prettily situated in the valley of the Leber or Liepvrette, an affluent of the Rhine, near the French frontier. The population in 1889 was 11,824.

MARLBOROUGH, a municipal and parliamentary borough of Wiltshire, England, situated on the great highroad between London and Bath, and distant seventy-five miles from the former, thirty-two from the latter, and thirteen from Devizes. Population, 5,600.

MARLBOROUGH, a town of Middlesex county, Mass., about twenty-five miles west from Boston, with

stations on the Old Colony and the Fitchburg railways. It lies in a fertile hilly district, and contains a beautiful sheet of water 160 acres in extent, known as Williams Lake. Shoemaking is the staple industry, some of the factories in the department rivaling the largest in the world. There is a good public library; and three weekly newspapers are published in the town. The population increased from 8,474 in 1870 to 13,805 in 1890.

MARLBOROUGH, JOHN CHURCHILL, DUKE OF. John Churchill, the first duke of Marlborough, was born June 24, 1650. Arabella Churchill, his eldest sister, and the mother of the duke of Berwick, was born in the same house on February 28, 1648. When fifteen years old he obtained a place in the household of the duke of York, and about the same time his sister Arabella became maid of honor to the duchess and mistress of the duke (afterward James II.), two events which contributed greatly to the advancement of the Churchills. Next year, in 1666, he received, through the influence of his master, a commission in the guards, and left England for service at Tangiers. Such fighting as was waged with the Moors did not accord with his feelings, and he soon returned to his own country. For a few years afterward Churchill remained in attendance at the court, and it was during this period that the natural carefulness of his disposition was shown by his investing in an annuity a present of \$25,000 given him by a court beauty. In 1672, when England to her shame sent 6,000 troops to aid Louis XIV. in his attempt to subdue the Dutch, Churchill formed one of the company, and soon attracted the attention of Turenne, by whose profound military genius the whole army was directed. At the siege of Nimeguen Churchill acquitted himself with such success that the French commander predicted his ultimate rise to distinction. When Maestricht was besieged he saved the life of the duke of Monmouth, and received the thanks of Louis XIV. for his services. Early in 1678 he was married to Sarah Jennings, the favorite attendant on the Princess Anne, the younger daughter of the duke of York. Sarah Jennings had as little money as her husband, but this deficiency was more than compensated for by an abundance of energy and ambition.

On the accession of James II. the Churchills received a great increase in fortune. Colonel Churchill had been created a Scotch peer in 1682, and as a reward for his services in going on a special mission from the new monarch to Louis XIV. he was advanced to the English peerage under the title of Baron Churchill of Sandridge in Hertfordshire, the village in which the Jennings' property was situated. A step in the army was at the same time conferred upon him, and when the duke of Monmouth attempted his ill-fated enterprise in the western counties the second position in command was bestowed on Lord Churchill. Through his vigilance and energy victory declared itself on the king's side. After the death of Monmouth he withdrew as far as possible from the administration of public business. While on his embassy to the French court he had declared with emphasis that if the king of England should change the religion of the state he should at once leave his service, and it was not long before the design of James became apparent to the world. Churchill was one of the first to send overtures of obedience to the prince of Orange. Although he continued in a high position under James, and drew the emoluments of his places, he promised William of Orange to use every exertion to bring over the troops to his side. James had been warned against putting any trust in the loyalty of the man on whom he had showered so many favors, but the warnings were in vain, and on the landing of the

Dutch prince at Brixham Churchill was sent against him with 5,000 men. When the royal army had advanced to the downs of Wiltshire and a battle seemed imminent, James was disconcerted by learning that in the dead of night his general had stolen away like a thief into the opposite camp. For this timely act of treachery Churchill received another advancement in the peerage. He had now become the earl of Marlborough and a member of the privy council. William sent him with the army into the Netherlands and into Ireland. For some time there was no open avowal of any distrust in Marlborough's loyalty, but in May, 1692, the world was astonished at the news that he had been thrown into the Tower on an accusation of treason. Though the evidence which could be brought against him was slight, and he was soon set at liberty, there is no doubt that Marlborough was in close relations with the exiled king at St. Germain, and that he even went so far as to disclose to his late master the intention of the English to attack the town of Brest. The talents of the statesmen of this reign were chiefly displayed in their attempts to convince both the exiled and the reigning king of England of their attachment to his fortunes. The sin of Marlborough lay in the fact that he had been favored above his fellows by each in turn, and that he betrayed both alike apparently without scruple or without shame. Once again during the Fenwick plot he was charged with treason, but William, knowing that if he pushed Marlborough and his friends to extremities there were no other statesmen on whom he could rely, contented himself with ignoring the confessions of Sir John Fenwick, and with executing that conspirator himself. Not long afterward the forgiven traitor was made governor to the young duke of Gloucester, the only one of Anne's numerous children who gave promise of attaining to manhood. During the last year of William's reign Marlborough once more was placed in positions of responsibility. His daughters were married into the most prominent families of the land; the eldest became the wife of the eldest son of Lord Godolphin; the second married the only son of Lord Sunderland. Higher honors were in store for his family, and they came on the accession of Queen Anne in March, 1702. She had not been more than three days upon the throne before the knighthood of the Garter was conferred upon Marlborough. He was made captain-general of the English troops both at home and abroad, and master-general of the ordnance. The new queen did not forget the life-long service of his wife; three positions at the court by which she was enabled to continue by the side of the sovereign as closely as she had lived with the princess were united in her person. A week or two after the death of William it was agreed by the three great powers, England, Holland, and Austria, which formed the grand alliance, that war should be declared against France, and on May 4, 1702, the declaration was made by the three countries. Marlborough was made commander-in-chief of the united armies of England and Holland. In the first year of the campaign it was shown that the armies of the French were not invincible. Several fortresses which Louis XIV. had seized upon surrendered themselves to the allies. The successes of Marlborough caused much rejoicing in his own country, and for these brilliant exploits he was raised to the highest rank in the peerage, and rewarded with a handsome annuity.

The result of the campaign of 1703 inspired the French king with fresh hopes of ultimate victory. The dashing plans of Marlborough were frustrated by the opposition of his Dutch colleagues. When he wished to invade the French territory they urged him to besiege Bonn, and he was compelled to accede to their wishes.

After this digression from his first purpose he returned to his original plan of attacking Antwerp; but, in consequence of the incapacity of the Dutch leaders, the generals (Villeroi and Boufflers) of the French army surprised the Dutch division and inflicted on it a loss of many thousands of men. Marlborough was forced to abandon his enterprise, and all the compensation which he received was the capture of the insignificant forts of Huy and Limburg. After a year of comparative failure for the allies, Louis XIV. was emboldened to enter upon an offensive movement against Austria; and Marlborough was eager to meet him. A magnificent army was sent by the French king under the command of Marshal Tallard, with instructions to strike a blow at Vienna itself. Marlborough divined the intention of the expedition, and, without communicating his intentions to his colleagues, led his troops into Bavaria. The two armies (that under Marlborough and Prince Eugène numbering more than 50,000 men, while Tallard's forces were nearly 10,000 stronger) met in battle array near the village of Blenheim. The early part of the fight was in favor of the French. Three times were the troops led by Prince Eugène driven back in confusion; Marlborough's cavalry failed on their first attack in breaking the line of the enemy. But in the end the victory of the allies was conclusive. Nearly 30,000 of the French and Bavarians were killed and wounded, and in Blenheim alone 10,000 were made prisoners. Never was a victory more eagerly welcomed than this, and never was a conquering leader more rewarded than Marlborough. Poets and prose writers were employed to do him honor, and the lines of Addison comparing the English commander to the angel who passed over "pale Britannia" in the storm of 1703 have been famous for nearly two centuries. The manor of Woodstock, which was transferred by Act of Parliament from the crown to the duke, was a reward more after his own heart. The gift even in that form was a noble one, but the queen heightened it by instructing Sir John Vanbrugh to build a palace in the park at the royal expense, and, although the works subsequently caused much anxiety to the duke and duchess, \$1,200,000 of public money was spent on the buildings.

In the following year the battle of Ramillies (May 23, 1707) ended in the total rout of the French, and caused the transference of nearly the whole of Brabant and Flanders to the allies. Five days afterward the victor entered Brussels in state, and the inhabitants acknowledged the rule of the archduke. Antwerp and Ostend surrendered themselves with slight loss. After this victory Marlborough, ever anxious for decisive measures, wished to advance on Paris, but he was overruled. The allied army invested the town of Lille, on the fortifications of which Vauban had expended an immensity of thought; and after a struggle of nearly four months, and the loss of 30,000 men, the citadel surrendered. By the end of the year Brabant was again subject to the rule of the allies. On August 3, 1709, Tournay capitulated, and the two leaders, Marlborough and Eugène, led their forces to Mons, in spite of the attempt of Villars to prevent them. For the last time during the protracted war the two armies met in fair fight at Malplaquet, September 11, 1709, where the French leader had strengthened his position by extensive earthworks. The fight was long and doubtful, and, although the French ultimately retreated under the direction of Boufflers, for Villars had been wounded on the knee, it was in good order, and their losses were less than those of their opponents.

All that Marlborough had effected on the battlefield during these years of war had not prevented his position from being undermined by party intrigues at home. In

the early part of Queen Anne's reign his political friends were to be found among the Tories, and the ministry was chiefly composed of members of that party. After a year or two, however, the more ardent Tories withdrew, and two younger adherents of the same cause, Harley and St. John (both of whom were at present content to conceal their animosity to Marlborough), were introduced into the ministry. The duchess, partly through the influence of her son-in-law, the earl of Sunderland, and partly through the opposition of the Tories to the French war, had gone over to the Whig cause, and she pressed her views on the sovereign with more vehemence than discretion. She had obtained for her indigent cousin, Abigail Hill, a small position at court, and the poor relation very soon began to injure the benefactor who had befriended her. With Hill's assistance Harley and St. John widened the breach with the queen which was commenced by the imperious manner of the duchess. The love of the two friends changed into hate, and no opportunity for humiliating the family of Marlborough was allowed to pass away neglected. Sunderland and Godolphin were the first to fall (July-August, 1710); a few months later the duchess was dismissed from her offices; and, although Marlborough himself was permitted to continue in his position a short time longer, his fall was only delayed until the last day of 1711. Life in England had become so unpleasant that he went to the Continent, and he remained abroad until the death of Anne (August 1, 1714). Then he once more returned to the shores of England and resumed his old military posts, but he took little part in public affairs. At 4 o'clock on the morning of June 16, 1722, he died at Cranbourn Lodge, near Windsor. His widow, to whom must be assigned a considerable share both in his rise and in his fall, survived till October, 1744.

MARLOW, GREAT, a parliamentary borough of Buckinghamshire, England, is finely situated on the Thames, and on a branch of the Great Western Railway, thirty-seven miles west of London and twenty-five south-east of Oxford. Population, 8,000.

MARLOWE, CHRISTOPHER, the father of English tragedy and the creator of English blank verse, was born at Canterbury in February, 1564, and christened on the 26th of that month. The boy was educated at the King's School, Canterbury; matriculated as pensioner of Benet College, Cambridge, March 17, 1581; took the degree of bachelor of arts in 1583, and that of master of arts four years later. Before this date he had produced the first tragedy worthy of that name in our language, and called into existence that highest and most difficult of all its other than lyrical forms of verse, which alone has proved worthy of acceptance among his countrymen as the fit and adequate instrument of tragic drama. His first tragedy of *Tamburlaine the Great*, in two parts, was successively followed by *Doctor Faustus*, *The Jew of Malta*, *Edward the Second*, and *The Massacre at Paris*. The tragedy of *Dido, Queen of Carthage*, was probably completed for the stage after his death by Thomas Nash.

The only authentic record concerning the death of Marlowe is an entry "in the burial-register of the parish church of St. Nicholas," Deptford: "Christopher Marlowe, slain by Francis Archer, June 1, 1593."

MARLY-LE-ROI, chief place of a canton in the department of Seine-et-Oise, France, five miles to the north of Versailles and three miles to the south of St. Germain-en-Laye, is, notwithstanding some fine country houses, a dull and unattractive village of 1,250 inhabitants, which owes all its celebrity to the sumptuous chateau of Louis XIV.

MARMONT, AUGUSTE FRÉDÉRIC LOUIS VIESSE

DE, duke of Ragusa, and marshal of France, one of Napoleon's earliest friends and most trusted generals, was born at Châtillon-sur-Seine, on July 20, 1774. Marmont became General Bonaparte's aide-de-camp, and accompanied him to Italy and Egypt, winning distinction and promotion as general of brigade. In 1799 he left Egypt with Bonaparte to the mercy of the English; he was present at the revolution of the 18th Brumaire, and organized the artillery for the expedition to Italy, which he commanded with great effect at Marengo. For this he was at once made general of division. In 1801 he became inspector-general of artillery, and in 1804 grand officer of the Legion of Honor. In 1805 he received the command of a corps, with which he did good service at Ulm. He was then directed to occupy Dalmatia with his army; he defeated the Russians October 30th, at Castel Nuovo, and occupied Ragusa. In 1807 he was made duke of Ragusa, and in 1809, being summoned up to the help of Napoleon, who was closely beset in the island of Lobau, earned the marshal's baton by his conduct at Wagram. In July, 1810, he was hastily summoned from his palace, where he lived in Eastern luxury, to succeed Masséna in the command of the French army in the north of Spain, called the army of Portugal. The skill with which he maneuvered his army, during the year he commanded it, has always been acknowledged. His relief of Ciudad Rodrigo in the autumn of 1811 in spite of the presence of the English army was a great feat, and in the tactics which preceded the battle of Salamanca he had the best of it. The extension of his left, July 22, 1812, was, however, fatal, and its result was the great defeat of Salamanca, in which Marmont was severely wounded in the right arm and side. He retired to France to recover, and was still hardly cured when, in April, 1813, Napoleon gave him command of the sixth corps. With it he served in the battles of Lützen, Bautzen, and Dresden, and throughout the defensive campaign of 1814, until the last desperate battle before the walls of Paris, from which he drew back his forces to the commanding position of Essonne. Marmont betrayed his trust and suffered for it. On the restoration of the Bourbons he was made a peer of France, and a major-general of the royal guard, and in 1820 a knight of St. Esprit and a grand officer of the order of St. Louis, but he was never trusted, never popular. He was the major-general of the guard on duty in July, 1830, and was ordered to put down with a strong hand any opposition to the ordinances. After persevering for some time he gave way, and allowed the republicans to succeed in their revolution. This defection brought more obloquy upon him, and the Duc d'Angoulême even ordered him under arrest, saying, "Will you betray us, as you betrayed him?" He died in 1852.

MARMONTEL, JEAN FRANÇOIS, one of the most distinguished men of letters in Paris during the latter half of the eighteenth century, was born in Limousin, in 1724, and died in 1799.

MARMORA, SEA OF. See BLACK SEA.

MARMOT. The word *marmot* may be considered to include animals belonging to the three following genera:—The true marmots, forming the genus *Arctomys* ("bear-mouse"), so called from the thick-set, bear-like form of its members; the prairie marmots of North America, better known as the "prairie dogs," (*Cynomys*, "dog-mouse"); and the pouched marmots, or sousliks, comprising the genus *Spermophilus*, or seed-lovers, so named from the character of their food. These three genera are all closely allied to each other, and together form the subfamily *Arctomyiinae* of the great squirrel family, the *Sciuridae*, of which the only other subfamily the *Sciurinae*, consists of the true squirrels (*Sciurus*),

and the flying-squirrels (*Pteromys*). The members of the marmot subfamily are confined to the northern hemisphere, and in fact are almost entirely limited to the north temperate zone, in marked contrast to the genera of the subfamily *Sciurinae*, which attain their greatest development in tropical or semi-tropical countries.

MARNE, a department of the northeast of France, made up from Champagne-Pouilleuse, Rémois, Perthois, Vallage, and La Brie-Champenoise, districts formerly belonging to Champagne. Its chief town, Châlons-sur-Marne, is ninety-two miles in a direct line east of Paris, bounded on the west by Seine-et-Marne and Aisne, on the north by Ardennes, on the east by Meuse, on the south by Haute-Marne and Aube. The population in 1881 was 421,027, an increase of 116,371 since 1801.

MARNE, HAUTE, a department of eastern France, made up for the most part of districts belonging to the former province of Champagne (Bassigny, Perthois, Vallage), with smaller portions of Lorraine and Burgundy, and some fragments of Franche-Comté; the capital, Chaumont, being 133 miles east-southeast from Paris in a direct line, and it is bounded on the northeast by Meuse, on the east by Vosges, on the southeast by Haute-Saône, on the south and southwest by Côte d'Or, on the west by Aube, and on the northwest by Marne.

MAROCCO. See MOROCCO.

MARONITES, an ecclesiastical community, and therefore also, according to the usages of the Christian East, a distinct political or social body, found mainly in or near the Lebanon, acknowledging the headship of the pope and the Latin standard of orthodoxy, but still retaining some peculiar privileges, including the use of a Syriac service—which few even of the priests now understand—and permission for the inferior clergy to marry. Maronite writers, trained either at Rome (in the Maronite college, founded by Gregory XIII. in 1584) or under Roman influences, have not unnaturally striven to prove that their church was always in essential accord with the Church of Rome except in ritual, but there is clear evidence that this is incorrect.

MAROONS. A *nègre marron* is defined by Littré as a fugitive slave who betakes himself to the woods; a similar definition of *cimarron* (apparently from *cima*, a mountain top) is given in the *Dictionary* of the Spanish Academy. The old English form of the word is *symaron*. The designation in modern English is applied almost as a proper name to the descendants of those negroes in Jamaica who, at the first English occupation in the seventeenth century, fled to the mountains.

MAROS-VÁSÁRHELY, a royal free town of Hungary, and capital of the Transylvanian county of Maros-Torda, is situated on the Maros and on the Hungarian Eastern Railway, fifty miles northeast of Hermannstadt. Population, 13,000.

MAROT, CLÉMENT, one of the most agreeable if not one of the greatest poets of France, and a figure of all but the first importance in her literary history, was born at Cahors, the capital of the province of Quercy, some time during the winter of the year 1496–97, and he appears to have been educated at the university of Paris, and to have then begun the study of the law. As early as 1514, before the accession of Francis I., Clément presented to him his *Judgment of Minos*, and shortly afterward he was either styled or styled himself *facteur* (poet) *de la reine* to Queen Claude. In 1524 Marot accompanied Francis on his disastrous Italian campaign. He was wounded and taken at Pavia, but soon released, and he was back again at Paris by the beginning of 1525. He died at Turin in 1544.

MARQUESAS ISLANDS, or MENDANA ISLANDS, an archipelago of twelve islands extending over 200

miles from southeast to northwest, and having a total area of 489 square miles. The lower or true Marquesas group consists of the islands Fatouhiva or Magdalena, Motane or San Pedro, Tahouata or Sta. Christina, and Hivaoa or Dominica, the last with a coast-line of more than sixty miles. With these is often included the rocky islet of Fetohougo or Hood's, lying in mid-channel to the north of Hivaoa. The northwestern or Washington group is formed of seven islands, the four largest being Roa-Poua or Adams, Houahoua or Washington, Noukahiva or Marchand (seventy miles in circumference), and Hiaou. Along the center of each island is a ridge of mountains, sometimes attaining an altitude of 3,500 feet, whence rugged spurs forming deep valleys stretch toward the sea. Except on a few barren peaks the islands are clothed with verdure, and in the valleys, which are well watered with streams and brooks, the vegetation is luxuriant. The flora includes over four hundred known species, many of them identical with those belonging to the Society Islands. The vegetable products comprise bananas, bread-fruit, yams, plantains, wild cotton, bamboos, sugar-cane, cocoa-nut, and dwarf palms, and several kinds of timber trees. The land fauna is, however, very poor: there are few mammals with the exception of dogs, rats, and pigs; and amphibia and insects are also generally scarce. Of twenty species of birds more than half belong to the sea, where animal life is as abundant as at other sub-tropical Polynesian groups.

The climate of the Marquesas, although hot and humid, is not unhealthy. The inhabitants, a native Polynesian race, have in many respects a great affinity to the Tahitians, but excel them in symmetry of form. They live chiefly on bread-fruit, vegetables, and fish, almost entirely neglect agriculture, but rear hogs and fowls in great numbers. At the commencement of the present century the population exceeded 20,000, but since then petty warfare, infectious maladies, and various other causes have greatly reduced its number; and on December 31, 1876, it reached only 5,754.

MARQUETRY. See FURNITURE.

MARQUETTE, a city and port of entry of the United States, and the county seat of Marquette county, Mich., lies on a bluff about twenty-five feet above a bay of Lake Superior, and is a terminus of the Marquette, Houghton and Ontonagon, and the Detroit, Mackinac and Marquette Railroads. Marquette is a place of importance as the chief shipping port for the great iron-ore region of western Michigan (787,150 tons shipped in 1881), and contains a number of blast furnaces, foundries, machine-shops, and powder-mills, while at the same time it has a reputation as a resort for invalids and tourists. A Roman Catholic cathedral, convent, and orphan asylum are among the public buildings. Population (1890), 9,093.

MARQUETTE, JACQUES, a Jesuit missionary and explorer, was born in 1637, at Laon in France, and died May 18, 1675, on the banks of a small stream, now known as the Marquette, which has its mouth on the eastern shore of Lake Michigan. Having joined the Society of Jesus, he sailed for Canada in 1666, spent eighteen months in the vicinity of Three Rivers, founded the mission of Sault Sainte Marie, on Lake Superior, in 1668, and followed the Hurons to Mackinaw in 1671. It is mainly, however, as Joliet's companion in his voyage down the Mississippi in 1673, that Marquette holds a permanent position in the history of discovery in America.

His narrative, first published in Thevenot's *Recueil de Voyages* (Paris, 1681), is printed along with other documents relating to him in Shea's *Discovery and Exploration of the Mississippi Valley* (New York, 1852).

MARQUIS, or MARQUESS, a title and rank of nobility, the second in the order of the British peerage, and therefore next to duke. A marquis is "most honorable," and is styled "my lord marquis." His wife, who also is "most honorable," is a marchioness, and is styled "my lady marchioness." The coronet is a circlet of gold on which rest four leaves and as many large pearls, all of them of equal height and connected.

MARRIAGE, LAW OF. Marriage may be defined here as the act, ceremony, or process by which the legal relationship of husband and wife is constituted. In most if not all legal systems it takes the form of a contract—the mutual assent of the parties being the prominent and indispensable feature of the ceremony. While the consent of parties is universally deemed one of the conditions of a legal marriage, all the incidents of the relationship constituted by the act are absolutely fixed by law. It should be added that, while marriage is generally spoken of by lawyers as a contract, its complete isolation from all other contracts is invariably recognized. Its peculiar position may be seen at once by comparing it with other contracts giving rise to continuous relationships with more or less indefinite obligations, like those of landlord and tenant, master and servant, etc. In these the parties may in general make their rights and duties what they please, the law only intervening when they are silent. In marriage every resulting right and duty is fixed by the law.

In the *Canon Law*, which is related on the one hand to the civil law, on the other to the modern matrimonial law of Europe, although marriage was not merely a contract but a sacrament, the validity of marriages by consent was nevertheless admitted.

In England marriage may be the subject of an ordinary contract on which an action may be brought by either party. It is not necessary that the promise should be in writing, or that any particular time should be named. The parties were formerly inadmissible as witnesses in this action; but they are now competent to give evidence, subject to the condition that the plaintiff shall not recover "unless his or her testimony shall be corroborated by some other material evidence." The ordinary defenses, *e. g.*, fraud, discharge, minority, are available in these actions, and there are also special defenses arising from the nature of the contract, such as the bad character of the plaintiff, the relationship of the parties within the prohibited degrees, etc. Promises to marry are not within the meaning of "agreements made in consideration of marriage" in the statute of frauds, which requires such agreements to be in writing. Contracts in restraint of marriage, *i. e.*, whose object is to prevent a person from marrying anybody whatever, are void, as are also contracts undertaking for reward to procure a marriage between two persons. These latter are termed marriage brokerage contracts.

Any man and woman are capable of marrying, subject to certain disabilities, some of which are said to be canonical as having been formerly under the cognizance of the ecclesiastical courts, others civil. The effect of a canonical disability as such was to make the marriage not void but voidable. The marriage must be set aside by regular process, and sentence pronounced during the lifetime of the parties. Natural inability at the time of the marriage to procreate children is a canonical disability. Civil disabilities are (1) the fact that either party is already married and has a spouse still living; (2) the fact that either party is a person of unsound mind; (3) want of full age, which for this purpose is fixed at the age of puberty as defined in the Roman law, *viz.*, fourteen for males

and twelve for females; (4) proximity of relationship within the prohibited degrees, already alluded to. The prohibitions extend not only to *consanguinei* (related by blood) but to *affines* (related by marriage). A man may neither marry his sister nor deceased wife's sister, for both are related to him in the second degree; nor his sister's daughter, nor his deceased wife's sister's daughter, for both are in the third degree; but he may marry his first cousin, for she is in the fourth. Two brothers may marry two sisters, or a father and son a mother and daughter.

In the United States the absence of ecclesiastical courts has suggested difficulties as to the extent to which the law of England on this subject continued to prevail after the Revolution. "All our marriage and divorce laws, and of course all our statutes on the subject, in so far as they pertain to localities embraced within the limits of particular States, are State laws and State statutes, the national power with us not having legislative or judicial cognizance of the matter within those localities." Some of the States have extended the ages below which marriage cannot take place. The common law of the States is assumed to be that "a contract *per verba de presenti*, or *per verba de futuro cum copula*, constitutes a complete marriage." Conditions, however, may be imposed by the various State legislatures, and as to these the rule has established itself in American jurisprudence that "a marriage good at common law is good notwithstanding the existence of any statute on the subject, unless the statute contains express words of nullity." So when State legislation requires any particular form to be used the want thereof only invalidates the act if the statute expressly so enacts. Many of the State codes inflict penalties on ministers or justices for celebrating the marriage of minors without the consent of the parents or guardians. The original law as to prohibited degrees has been considerably modified in the United States. The prohibition of marriage with a deceased wife's sister is all but unknown in the United States.

The law of marriage which prevails in all the States of the Union is based upon the presumption that marriage is a contract, differing chiefly from all other contracts in the fact that it cannot be annulled by consent of the parties thereto, but only by the judgment of a court, or, possibly yet in some States, by an act of the legislature. The forms prescribed are not essential, being in the nature of evidence rather than essential to validity. Marriage may be legally inferred from the acts of the parties and from declarations made by them. The rule is one of evidence. The Levitical degrees do not generally hold in the States, and the statutory provisions as to competency to contract marriage usually confine themselves to questions of age, or, at most, to those of blood relationship. And a marriage contracted under the statutes of the State where the marriage takes place is good afterwards in a State where such marriage, under the statutes, might not have been lawful in the first place.

But the statutes of many of the States have made radical changes from the harshness of the common law as it related to marriage, and to the relation of husband and wife. Under that law upon marriage the husband acquired an absolute ownership of all the wife's goods, chattels and moneys, and all demands due to her became his as soon as he could acquire possession of them. The wife acquired no corresponding interest in her husband's property. A mode of evading these injustices was contrived by the courts of equity, but the more recent statutes of many of the States, and of all the newer ones, has left this inter-

vention unnecessary. By these it may be said that the *Feme Covert* of the common law has ceased to exist. The real and personal property which a woman owns at the time of her marriage is hers, sole and separate, free from any claim by her husband's creditors. She may convey this property, or devise and bequeath it. In addition, in many of the States she is clothed with the capacity to independently enjoy its proceeds. She may contract or do business on her own account, and sue and be sued as a separate individual. These changes in the common law are revolutionary, as controlling the law of marriage, and the relation of husband and wife.

MARRYAT, FREDERICK, born in 1792, has never been surpassed as a writer of tales of nautical adventure. His own life supplied him with abundant raw materials for his art. He distinguished himself as a boy by frequently running away toward sea; and at last, at the age of fourteen, he was allowed to enter the navy. His first service was under Lord Cochrane in the famous *Impérieuse*, and no midshipman ever had a livelier apprenticeship to the sea. During his two and a half years of service under the daring and active Cochrane, the young midshipman witnessed more than fifty engagements, many of them extremely brilliant, and had experience of every description of service, fighting duels with fairly matched ships of war, engaging gunboats, engaging batteries, storming forts, capturing and cutting out merchantmen. Before the general peace of 1815 he had added considerably to this experience of active service, and gained a wide knowledge of conditions of life on board ship under various commanders. He frequently received honorable mention for his behavior in action, and in 1818 he received the medal of the Humane Society for "at least a dozen" gallant rescues. He commanded with distinction in the Burmese war of 1824-25. And Marryat's honors were not confined to gallant exploits; he was the inventor of a code of signals, obtained some celebrity as a caricaturist, and was elected an F.R.S.

Marryat brought ripe experience and unimpaired vivacity to his work when he began writing fiction. His first production was *Frank Mildmay, or the Naval Officer*, published in 1829, and his second, published nine months later, *The King's Own*. The novels of the sea captain at once won public favor. His first attempt was somewhat severely criticised from an artistic point of view. It was without form, though the reverse of void; he had packed into it matter enough for half a dozen novels. Marryat was accused also of gratifying private grudges by introducing real personages too thinly disguised. He admitted the justice of these criticisms, and rapidly learned the mechanical part of his new business without losing any of the vivacious charm of his style. *The King's Own* was a vast improvement in point of construction, upon *Frank Mildmay*; and he went on, through a quick succession of tales, *Newton Forster*, *Peter Simple*, *Jacob Faithful*, *The Pacha of Many Tales*, *Japhet in Search of a Father*, *Mr. Midshipman Easy*, *The Pirate and the Three Cutters*, till he reached his high-water mark of constructive skill in *Snarley-yow, or the Dog Fiend* (1837). If he never surpassed this in story-telling art, humorous portraiture, and richness of incident, the records of circulating libraries and the penciled comments of their subscribers show that his subsequent works—he produced twenty-four in all during his twenty years of authorship—were no less capable of riveting the attention, especially of youthful readers. The following is the list, with the dates of publication:—*The Phantom Ship* (1839), *A Diary in America* (1839), *Olla Podrida* (1840), *Poor Jack* (1840), *Master-*

man Ready (1841), *Joseph Rushbrook* (1841), *Percival Keene* (1842), *Monsieur Violet* (1842), *The Settlers in Canada* (1843), *The Privateer's Man* (1844), *The Mission or Scenes in Africa* (1845), *The Children of the New Forest* (1847), *The Little Savage* (1847), and *Valerie*, not completed by Marryat (1849). He died in 1848.

MARS was a Roman deity whose name has passed into later literature as that of the war god. There grew in Rome a tendency, fostered by Greek influence, to consider Jupiter as the one great god, and the other deities as representing special sides of his character. Mars then was identified with the Greek ARES (*q. v.*), and was regarded as almost the same in nature with the warlike element in Jupiter as Feretrius and Triumphantor. In the actual worship of the Romans Mars bears a very different character, which, however, had almost disappeared from the mind of the people before Augustus built in the Forum his temple to Mars Ultor, the avenger of the murder of Julius Cæsar.

Father Mars, Marspiter, Maspiter, Mavors, or Maurs, was the great god of one of the races that composed the Roman state. He is the god of heaven, the giver of light, the opener of the new year; he hurls the thunder and sends the rain. In cases of drought the *lapis manalis*, which was kept in his temple on the Appian Way, was carried through the city by the *pontifices*. The first month of the old Roman year was the month of Mars, still called March. On the first day the god had been born; and on the same day various annual ceremonies both political and religious took place; and the holy fire was renewed in the temple of Vesta.

Next to Jupiter, Mars was the chief protecting god of the Roman state. Quirinus Mars was the father of the twin founders of the city, and his sacred wolf was the emblem of the city and the foster-mother of the twins. The Campus Martius outside the city was dedicated to the god from a very early time; there the young men practiced their warlike exercises; there the horse races, *equiria*, in honor of Mars, and the sacrifice of the "October horse" took place. There also was held the census every fifth year, followed by the purificatory ceremonial for the whole city, which was dedicated to Mars. When war broke out, the Roman general clashed the shield and spear in the temple of Mars and invoked the god; the spoils of victory belonged to him after Jupiter Feretrius.

MARSALA, a seaport on the west coast of Sicily, in the province of Trapani, twenty miles south of Trapani, to the north of the river Marsala, with a station on the railway between Trapani and Palermo. A flourishing and well-built town, with wide paved streets, it possesses a castle, a cathedral, a theater, cavalry barracks (now occupied by government offices), an academy of science and literature, and a public library. From 31,350 in 1861 the population of the commune had increased by 1881 to 40,251; that of the town was 14,105 in 1871, or, with the suburbs of Porta Gartibaldi, Porta Mazzara, and Porta Trapani, 17,666.

MARSDEN, WILLIAM, an eminent Oriental scholar, was born at Dublin, in 1754, and died in October, 1836.

MARSEILLAISE, the national hymn of the French, was composed at Strasburg in April, 1792, by ROUGET DE LISLE (*q. v.*), then an engineer officer, who supplied both the words and the music. The song was at first known as the *Chant de l'armée du Rhin* and received its present name through being first sung in Paris by the Provençal volunteers who stormed the Tuileries. This magnificent hymn of liberty came as an inspiration in the stirring days of the Revolution. Its last verse was added by the Girondins, who sang it on their way to the guillotine. Under the Bourbons it was not

allowed to be sung, but the men of 1830 and 1848 marched to its strains. Napoleon III. tried to substitute the puerile *Partant Pour la Syrie* for it, but since September 4, 1870, when it heralded the birth of the Third Republic, it has been officially recognized as the national hymn.

MARSEILLES, the third largest city of France, and the chief commercial port of the Mediterranean, is the chief town of the department of Bouches du Rhône, headquarters of the fifteenth army corps, the seat of a bishop, and of numerous commercial and scientific institutions. The population in 1881 was 360,099.

The port of Marseilles has in all an area of 422 acres, but there are only four and one-half miles of quays, an amount of accommodation quite inadequate for the enormous traffic, now amounting to more than 3,400,000 tons. Protected on the east by Cape Croisette, and on the west by Cape Couronne, the roadstead of Marseilles and its approaches are lighted by six lighthouses, of which the most distant (130 feet high) is eight miles southwest of the town, on the Planier rock. The docks along the Lazaret basin cover an area of forty-five acres, and the company to which they belong also holds a large area of ground for their enlargement, and has exclusive rights over one and one-half to two miles of quays. The warehouses occupy twenty-seven acres of floor space on their several stories, and the 200,000 tons of goods for which they afford storage are easily manipulated by powerful hydraulic machinery wrought by steam. The large steam vessels for trading with Algiers, the Levant, and the farther East lie in La Joliette, but the old harbor still displays the ancient characteristics of Marseilles. The old-fashioned Mediterranean traders with their lateen sails are crowded together in the Rive Neuve Canal to the south, while the sailing vessels of heavy tonnage are moored to the quay by their sterns. At the end of the old harbor opens out La Cannebière, so called from former rope-walks, of which it occupies the site; it is now the liveliest part of the town, where the principal cafés, shops, hotels, naval and commercial agencies, as well as the Bourse, are found.

Despite its antiquity, Marseilles has no ancient monuments. The old cathedral, which superseded a temple of Diana, itself preceded, it is said, by an altar of Baal, has given place to a modern structure, of which the exterior only is completely finished.

Marseilles contains large hospitals. The Hôtel Dieu in the old town was founded in 1188, and rebuilt in 1593; it has 450 beds.

The scientific institutions of the town are also numerous, including a faculty of science, astronomical observatory, a preparatory school of medicine and pharmacy, a musical conservatoire, a school of art, a lyceum, and many private institutions.

The mean temperature of Marseilles is 58° Fahr.; frost is rare, and snow almost unknown. The heat of summer is tempered during the day by the cooling sea breeze. The most disagreeable wind is the mistral, a violent and cold northwest wind, which blows on an average one hundred and thirty-eight times a year, but has at least the advantage of restoring salubrity to the frequently unhealthy shores of the Mediterranean. The sirocco, a southeast wind, blows some sixty times a year; though hot and parching in summer, it softens the winter climate. The east-southeast wind is cold and damp, and brings rain. The Canal de la Durance has greatly modified the climate of Marseilles and its neighborhood, for by restoring vegetation it has increased the fogs and rains; there is now an annual rainfall of nearly twenty-four inches.

Marseilles is at once the largest commercial port of

France and a manufacturing town, working up the raw materials brought in by sea from every part of the world. The leading industry is that of soap-making, which occupies sixty factories with 1,200 artisans, and annually produces 65,000 tons, valued at about \$10,000,000. With this manufacture are connected oil and chemical works; in the former, which employ 2,000 to 2,500 workmen, 55,000 tons of different oils are produced yearly. The chemical works comprise a dozen mills, manufacturing chiefly the salts of soda and concentrated acids. Two thousand operatives are there employed, and the value of their annual production is estimated at \$1,600,000. There are also three sugar refineries, producing 65,000 tons of loaf-sugar, of which more than half is reexported. Sulphur from Sicily too is refined and converted into sticks or flowers of sulphur, to the value of \$400,000. Petroleum refining occupies 100 workmen. Metallurgy is another great industry; a large quantity of ore, imported from Elba, Spain, and Algeria, is smelted in the blast furnaces of St. Louis in the suburbs. The Mediterranean iron-works and yards, together with other private companies, have large workshops for the construction or repair of marine steam-engines and every branch of iron shipbuilding, employing several thousand workmen. Marseilles is a great center for the extraction of silver from lead ore; 16,000 tons of lead and 25 tons of fine silver are separated annually. There are 64 flour-mills with 300 sets of stones, and 100 factories prepare semolina and other cereal pastes, while 34 tanyards dress 500,000 sheep skins and 335,000 goat skins. To this list of industries must be added the manufactories of matches, candles, and wax-lights, with brass foundries, glass-works, and manufactures of coral, and of Oriental hosiery.

The port of Marseilles is the center of numerous lines of steamers. The French company of mail steam packets (*Messageries Maritimes*) dispatch their boats regularly to Italy, Egypt, Réunion, India, China, and the far East, as well as to Greece, Turkey, the Black Sea, Smyrna, and Syria. The Transatlantic Company runs its vessels to Algiers, Tunis, Malta, and the coast of Italy, and has also a regular line between Marseilles and New York. Many private companies have services to Corsica, Algiers, the coast of Languedoc and of Spain, and the Italian Riviera. Other lines connect Marseilles with Brazil and La Plata, Havre, and London. Landward there are two lines of railway to Aix, and a third to Toulon. A navigable canal is greatly needed to connect the port directly with the Rhone, in order to avoid the difficulties of egress from the river, and to make Marseilles the natural outlet of the rich Rhone basin. The countries with which the greatest traffic is maintained are Algeria, Spain, Italy, Turkey, and the Russian ports on the Black Sea; next in order come England, Austria, the western coast of Africa, Réunion, the Cape, British India, Brazil, the Antilles, China, and Senegambia. From the Black Sea, Turkey, and Algeria come the cereals which form the chief imports in point of bulk; from Italy, Spain, the Levant, China, and Japan the silk, which is the import of greatest value (\$20,000,000 yearly). Then follow ores and metals, iron, cast iron, lead, and copper; also wood, raw material for oil manufacture, raw sugar, cattle, wool and cotton, rice, and various dry vegetable foods, petroleum, cocoa, gums, pepper, and other spices, wines and brandies, coal, skins, cod-fish, cheese, and sponges. The principal exports in respect of value are silk, woolen, and cotton fabrics, refined sugars, wines and spirits; those of greatest bulk are cereals in the form of grain or flour, coal, building materials, oil cakes, iron and other manufactures in metal, wines and spirits, oils, glass and crystal, lead, and coffee.

Of the seagoing tonnage, one-third is under the French flag, but the coasting trade, carried on by French sailors alone, is almost half as large as the ocean trade. The shipowners of the port possess almost seven hundred vessels, without counting the hundreds of fishing boats which ply along the coast.

After the ravages of successive streams of invaders, Marseilles, which is said to have been founded by Phœnicians, was repopled in the tenth century under the protection of its viscounts. In 1112 the town bought up their rights, and was formed into a republic, governed by a podestat, who was appointed for life, and exercised his office in conjunction with three notables, and a municipal council, composed of eighty citizens, three clerics, and six principal tradesmen. During the rest of the Middle Ages, however, the higher town was governed by the bishop, and had its harbor at the creek of La Joliette. The southern suburb was governed by the abbot of St. Victor, and owned the Port des Catalans. Situated between the two, the lower town, the republic, retained the old harbor, and was the most powerful of the three divisions. The period of the crusades brought great prosperity to Marseilles. The activity of its shipbuilding, the magnitude of its fleet, the importance of its commerce and manufactures, all increased at once. The count of Provence, Raymond Bérenger, Charles of Anjou, and afterward Alphonso of Aragon, successively attempted to make themselves masters of the town; it suffered at different times from incendiarism, pillage, and massacre during the thirteenth and fourteenth centuries and in the beginning of the fifteenth. King René, who had made it his winter residence, however, caused trades, arts, and manufactures again to flourish. Under Francis I., the disaffected constable De Bourbon vainly besieged the town with the imperial forces in 1524. During the wars of religion Marseilles took an active part against the Protestants, and long refused to acknowledge Henry IV. The loss of the ancient liberties of the town brought on new disturbances under the Fronde, which Louis XIV. came in person to suppress. He took the town by storm, and had Fort St. Nicolas constructed. Marseilles repeatedly suffered from the plague, and an epidemic raged from May, 1720, to May, 1721, with a severity for which it is almost impossible to find a parallel; Bishop Belsunce, Chevalier Rose, and others immortalized themselves by their courage and devotion.

During the Revolution the people rose against the aristocracy, who up to that time had governed the commune. In the Terror they rebelled against the convention, but were promptly subdued by General Carteaux. The wars of the empire, by dealing a severe blow to their maritime commerce, excited the hatred of the inhabitants against Napoleon, who accordingly hailed with enthusiasm the return of the Bourbons and the defeat of Waterloo. The news of the latter provoked a bloody reaction in the town against those suspected of imperialism. Since 1815 the prosperity of the city has received a considerable impulse from the conquest of Algeria and the opening of the Suez Canal. The completion of the canal of the Durance has covered with verdure the formerly arid country surrounding the town, and the openings made in the old part of Marseilles have improved its sanitary condition.

MARSH, GEORGE PERKINS, LL.D., American diplomatist and philologist, was born at Woodstock, Vt., March 17, 1801, graduated at Dartmouth College in 1820, and practiced law at Burlington, Vt., devoting himself also with ardor to philological studies. In 1835 he was elected to the State legislature, and in 1842 he became a member of Congress. In 1849 he was appointed United States minister to Turkey,

and in 1852 discharged also a special mission to Greece, returning to Vermont in 1853. In 1861 he became United States minister to Italy, and died in that office at Vallombrosa, July 24, 1882.

MARSHAL (from Old High German *marah*, horse, and *scal*, care-taker), in its original signification a servant of the royal *manège*, was afterward a title given in different countries to the holder of various high offices, military and civil. In the time of Philip Augustus the commander of the French forces was called the marshal of France. In England the marshal was a high officer of state as far back as the twelfth century.

In Scotland (an orthography resembling the French *maréchal* being adopted) the office of *marischal*, probably introduced under David I., became from the fourteenth century hereditary in the family of Keith. The military title of field-marshal was at first borrowed by the Germans from the French *maréchal de champs*; and in the Thirty Year's War it meant much what quartermaster-general does now. It was not till the last century that the word rose in dignity so as to signify the highest military dignity except that of commander-in-chief. It was adopted into the British military system from Germany—the first field-marshals being John, duke of Argyll, and, George, earl of Orkney, made so by George II. in 1736.

MARSHALL, JOHN, chief justice of the United States, was born in Fauquier county, Va., on September 24, 1755. As lieutenant and captain he served in the revolutionary army from 1775 to 1780. In 1781 he began the practice of the law, and two years later removed to Richmond. At various times from 1782 to 1798 he was elected a member of the Virginia legislature, in 1788 a member of the Virginia convention for the ratification of the constitution; in 1797 he was envoy extraordinary to France, and in 1799 a member of Congress; in 1800 he became secretary of state; and on January 31, 1801, he was appointed to the chief-justice-ship, which position he held until his death, on July 6, 1835. Marshall as a lawyer soon rose to the first rank at the Virginia bar, and acquired also a national reputation. In the Virginia convention of 1788 his influence was second only to that of Madison in securing the adoption of the constitution. But, unlike Madison, he continued, under the constitution, to support the administration of Washington and Federalist measures in general. It was as chief justice of the supreme court of the United States, however, that Marshall won lasting fame. His reports, filling about thirty volumes, form a work which time will only render more valued.

MARSHALL, a Michigan city in Calhoun county, of which it is the capital, lies on the Kalamazoo river. It has extensive machine shops, churches, banks, and exceptional school facilities. The town has various manufactures and considerable trade with the surrounding country. It has railroad and telegraph connections. Population (1890), 3,957.

MARSHALL, a city of Texas, in Harris county, of which it is the county seat, is a considerable railroad center, and also a town of some manufacturing importance. It has a large trade in cotton and other agricultural products. It is situated in the midst of a rich farming and mining country, and bids fair to become a town of considerable importance in the near future. Near the town are situated mineral springs of high reputation locally. Population (1890 census), 7,196.

MARSHALL ISLANDS. See MICRONESIA.

MARSHALLTOWN, the county seat of Marshall county, Iowa, is situated on the Iowa river, at the junction of several railways, and in the midst of a grain and stock producing region. Among its numerous industries are sugar-refining, wagon-making, and the manu-

facture of barbed steel wire for fencing purposes. The population was 3,218 in 1870 and 6,240 in 1880, and 8,914 according to the 1890 census.

MARSHMAN, JOSHUA, a Baptist missionary and Oriental scholar, was born on April 20, 1768, at Westbury Leigh, in Wiltshire, England. He died at Serampore, December 5, 1837.

MARSIGLI (Latinized MARSILIUS), LUIGI FERDINAND, soldier and savant, was born at Bologna, July 10, 1658, and died in the same city, November 1, 1730.

MARSTON, JOHN, was one of the most vigorous satirists and dramatists of the Shakespearean age. He was probably some ten years younger than Shakespeare. He has been identified with a gentleman commoner of Brasenose College, Oxford, who entered in 1591, and was admitted B.A. in 1593 as the eldest son of an esquire. If this is the same John Marston that was buried in the Temple Church in 1634, under a tombstone *Oblivioni Sacrum*, the identification of him with the poet is most probably right.

MARSYAS was a Phrygian god, whose name has passed into Greek mythology.

MARTEN, the name of a group of animals constituting a small but well-defined section of the family *Mustelidae*, belonging to the Arctoid or bear-like division of the order *Carnivora*. In geographical distribution the Martens are limited to the northern hemisphere, ranging throughout the greater part of the northern temperate regions of both Old and New Worlds, as far north as conditions of existence suited to their habits are met with, and southward in America to 35° N. lat., while in Asia one species is met with as far as the island of Java.

The various species appear to be very similar in their habits. They live in woods and rocky places, and are thoroughly arboreal, spending most of their time in trees, although descending to the ground in quest of prey. They climb with great facility, and are agile and graceful in their movements. Some species are said occasionally to resort to berries and other fruit for food, but as a rule they are strictly carnivorous, feeding chiefly on birds and their eggs, small mammals, as squirrels, hares, rabbits, and moles, but chiefly mice of various kinds, of which they destroy great numbers, and occasionally snakes, lizards, and frogs. In proportion to their size they are among the most bloodthirsty of animals, though less so than the true weasels. The female usually makes her nest of moss, dried leaves, and grass in the hollow of a tree, but sometimes in a hole among rocks or ruined buildings, and produces several young at a birth, usually from four to six. Though wild and untamable to a great degree if captured when fully grown, when taken young they are very docile, and have frequently been made pets of, not having the strong, unpleasant odor of the smaller *Mustelidae*. The common European marten appears to have been partially domesticated by the Greeks and Romans, and to have been used to keep houses clear from rats and mice before cats were introduced. In the same way, according to Hodgson, an allied species, the Yellow-bellied weasel (*Mustela kathiah*), "is exceedingly prized by the Nepalese for its service in ridding houses of rats."

The North American sable or marten is so closely allied to the European pine marten and Asiatic sable that it is very difficult to assign constant distinguishing characteristics between them. The importance of the fur of this animal as an article of commerce may be judged of from the fact that 15,000 skins were sold in one year by the Hudson's Bay Company as long ago as 1743, and the more recent annual exports have exceeded 100,000. It is ordinarily caught in wooden traps of very simple

construction, being little inclosures of stakes or brush in which the bait is placed upon a trigger, with a short upright stick supporting a log of wood, which falls upon its victim on the slightest disturbance. A line of such traps, several to a mile, often extends many miles. The bait is any kind of meat, a mouse, squirrel, piece of fish, or bird's head. It is principally trapped during the colder months, from October to April, when the fur is in good condition, as it is nearly valueless during the shedding in summer. Doctor Coues tells us that, notwithstanding the persistent and uninterrupted destruction to which the American Sable is subjected, it does not appear to diminish materially in numbers in unsettled parts of the country. It holds its own partly in consequence of its shyness, which keeps it away from the abodes of men, and partly because it is so prolific, bringing forth six to eight young at a litter. Its home is sometimes a den under ground or beneath rocks, but oftener the hollow of a tree, and it is said frequently to take forcible possession of a squirrel's nest, driving off or devouring the rightful proprietor.

MARTIAL (M. VALERIUS MARTIALIS) is a writer to whose merits it is difficult to do justice in the present day. His faults are of the most glaring kind; they are exhibited without the least concealment; and they are of the sort of which modern feeling is most intolerant. Living as he did under perhaps the worst of the many bad emperors who ruled the world in the first century, he addresses him and his favorites with the most servile flattery in his lifetime, reviles him immediately after his death, and offers equally fulsome incense at the shrine of his successor. No writer of equal genius has ever shown such an absence of dignity and independence of character in his relation to his richer friends and patrons. He is not ashamed to be dependent on them for gifts of money, for his dinner, and even for his dress. We cannot feel sure that even what seem his sincerest tributes of regard may not be prompted by the hope of payment. Further, there is no book in any literature which, both in expression and in the things treated of, sins so flagrantly against all instincts of propriety. A certain proportion of the epigrams in every book—perhaps one-fifth or one-sixth (in some books the proportion is much larger)—can be read by no class of readers with any other feelings than those of extreme distaste.

Our knowledge of Martial's life is derived almost entirely from himself. His writings do not, like those of Horace, supply materials for a continuous biography, nor do they lay bare every secret of his heart with the self-absorption of Catullus. But, as he writes frankly about everything that interested him, he has not only painted a very life-like picture, or rather drawn a multitude of very life-like sketches of Roman society in his time, but he has clearly marked his own position in and his own relation to that society. His criticism of men and manners enables us to judge of the standard which he applied to life, of the things which he liked and disliked, and of his own temper and disposition. Reference to public events enables us approximately to fix the date of the publication of the different books of epigrams, and from these dates to determine those of various important events in his life. The date of his birth may be assigned to the year 40 or 41.

MARTIAL LAW. See MILITARY LAW.

MARTIGUES, chief place of a canton in the department of Bouches-du-Rhône, France, stands on the southern shore of the lagoon of Berre, and at the eastern extremity of that of Caronte, by which the former is connected with the Mediterranean. Population (1890), 9,000.

MARTIN, the *Hirundo urbica* of Linnæus and *Chelidon urbica* of modern ornithologists, a bird very well known throughout Europe, including even Lapland, where it is abundant, retiring in winter to the south of Africa. It also inhabits the western part of Asia, and appears from time to time in large flocks in India. The Martin (or House-Martin, as it is often called, to distinguish it from the Sand-Martin presently to be mentioned) commonly reaches its summer quarters a few days later than the SWALLOW (*q.v.*), whose habits its own so much resemble that heedless persons often disregard the very perceptible differences between them, the Martin's white rump and lower parts being conspicuous as it flies or clings to its "loved mansionry" attached to our houses. This nest, made of the same material as the Swallow's, is, however, a far more difficult structure to rear, and a week or more is often occupied in laying its foundations—the builders clinging to the wall while depositing the mud of which it is composed. But, the base once securely fixed, the superstructure is often quickly added till the whole takes the shape of the half or quarter of a hemisphere, and a lining of soft feathers, mixed with a few bents or straws, fits it for its purpose. The Martin sets about building very soon after its return, and a nest that has outlasted the winter's storms is almost at once reoccupied; though if a new nest be needed its construction often involves great delay, for any excess of wet or drought retards the operation, and the work is generally placed in such an exposed situation that heavy driving rains will wash away the half-dried walls. However, the bird mostly perseveres against these and other troubles, contriving in the course of the summer to raise a second or, rarely, a third brood of offspring—though it is certain that the latest broods often die in the nest—apparently through failure of food.

The Sand-Martin, *Hirundo riparia* of Linnæus and *Cotile riparia* of modern writers, differs much in appearance and habits from the former. Its smaller size, mouse-colored upper surface, and jerking flight ought to render it easily recognizable from the other *Hirundinidæ*; but through carelessness it is seldom discriminated, and, being the first of the family to return to its northern home, the "early swallow" of newspaper-writers would seem to be nearly always of this species. Instead of the clay-built nest of the House-Martin, this bird bores, with a degree of regularity and an amount of labor rarely excelled in its class, horizontal galleries in a natural or artificial escarpment. When beginning its excavation, it clings to the face of the bank, and with its bill loosens the earth, working from the center outward, assuming all sorts of positions—as often as not hanging head downward. In Europe it is found nearly to the North Cape, and thence to the Sea of Okhotsk. In winter it visits many parts of India, and South Africa to the Transvaal territory. In America its range is even more extraordinary, extending (due regard being of course had to the season of the year) from Melville Island to Caiçara, in Brazil, and from Newfoundland to Alaska.

The Purple Martin of America, *Hirundo* or *Progne purpurea*, requires some remarks as being such a favorite bird in Canada and in the United States. Naturally breeding in hollow trees, it readily adapts itself to the nest-boxes which are very commonly set up for its accommodation; but its numbers are in some years and places subject to diminution in a manner which has not yet been satisfactorily explained. The limits of its range in winter are not determined, chiefly owing to the differences of opinion as to the validity of certain supposed kindred species found in South America; but according to some authorities it reaches the border of

Patagonia, while in summer it is known to inhabit lands within the Arctic Circle. The male is almost wholly of a glossy steel-blue, while the female is much duller in color above, and beneath of a brownish-gray.

MARTIN, ST., bishop of Tours, was born of heathen parents at Sabaria in Pannonia, about the year 316. When ten years of age he became a catechumen, and at fifteen, contrary to his own inclination, he entered the army. It was while he was stationed at Amiens that he divided his cloak with the beggar, and on the following night had the vision of Christ making known to his angels this act of charity to Himself. He died about 400.

MARTIN I., pope, succeeded Theodore I., in June or July, 649. He had previously acted as papal apocrisiarius at Constantinople, and was held in high repute for learning and virtue. Martin was arrested in the Lateran (June 15, 653), hurried out of Rome, and conveyed first to Naxos and subsequently to Constantinople (September 17, 654). He was ultimately banished to Cherson, where he arrived March 26, 655, and died on September 16th following. His successor was Eugenius I.

MARTIN II. See MARINUS I.

MARTIN III. See MARINUS II.

MARTIN IV., pope from 1281 to 1285, was the successor of Nicholas III. He was a native of Touraine, born about 1210, and his proper name was Simon de Brion. After holding various offices at Rouen and Tours, he was made chancellor of France by Louis IX. in 1260, and cardinal by Urban IV. in 1261. He acted as legate for this pope, and also for his successor Clement IV. After the death of Nicholas III. (August, 1280,) Charles of Anjou was able to secure the election of Cardinal Simon by the conclave at Viterbo (February 22, 1281). The Romans declined to receive him within their walls, and he was crowned at Orvieto. At the instance of Charles, whose tool he had become, he in November, 1281, excommunicated the emperor Michael Palæologus, who stood in the way of French projects against Greece—an act by which the union of the Eastern and Western churches was rendered impossible. For three years after the Sicilian Vespers in 1282 all the spiritual and material resources at his command were in vain employed on behalf of his patron against Peter of Aragon. He died at Perugia on March 25, 1285, and was succeeded by Honorius IV.

MARTIN V. (Otto di Colonna), pope from 1417 to 1431, was elected on St. Martin's day at Constance by a conclave, which after deposing John XXIII. had long experienced much perplexity from the conflicting claims of Gregory XII. and Benedict XIII. He died on February 20, 1431. His successor was Eugenius IV.

MARTIN, JOHN, a popular English painter, was born near Hexham, July 19, 1789. Martin removed to London in 1806, where he married at the age of nineteen, and led a struggling life, supporting himself by giving drawing lessons, and by painting in water colors, and on china and glass. His leisure was occupied in the study of perspective and architecture. His first picture, *Sadak in Search of the Waters of Oblivion*, was executed in a month. It was exhibited in the Royal Academy of 1812, and sold for fifty guineas. It was followed by the *Expulsion* (1813), *Paradise* (1813), *Clytie* (1814), and *Joshua* (1815). In 1821 appeared the famous *Belshazzar's Feast*, which excited much favorable and hostile comment, and was awarded a prize of £200 at the British Institute, where the *Joshua* had previously carried off a premium of £100. Then came *The Destruction of Herculaneum* (1822), *The Creation* (1824), *The Eve of the Deluge* (1841), and a long series of other Biblical and imaginative subjects,

many of which are widely known through engravings. In 1832-33 Martin received £2,000 for drawing and engraving a fine series of designs to Milton, and along with Westall he produced a set of Bible illustrations. During the last four years of his life he was engaged upon his large subjects of *The Judgment*, *The Day of Wrath*, and *The Plains of Heaven*. He was attacked with paralysis while painting, and died in the Isle of Man on February 17, 1854.

MARTINA FRANCA, a city of Italy in the province of Lecce, eighteen miles north of Taranto, on a hill near the sources of the Tara. The population of the city was 13,088 in 1861; that of the commune has increased from 16,637 in that year to 19,257 in 1890.

MARTINEAU, HARRIET, English woman of letters, was born at Norwich in 1802. The atmosphere of her home was industrious, intellectual, and austere; she herself was clever, weakly, and unhappy, and was, moreover, already growing deaf. In 1821 she began to write anonymously for the *Monthly Repository*, a Unitarian periodical, and was assured by her brother that authorship was her proper career. A little later she published *Devotional Exercises and Addresses, Prayers, and Hymns*.

She reviewed for the *Repository* at the rate of £15 a year, wrote stories (afterward collected as *Traditions of Palestine*), gained in one year (1830) three essay-prizes of the Unitarian Association, and eked out her income by needlework. In 1831 she was seeking a publisher for a series of tales designed as *Illustrations of Political Economy*. Till 1834 she continued to be occupied with her political economy series and with a supplemental series of *Illustrations of Taxation*. Four stories dealing with the poor-law came out about the same time. These tales, direct, lucid, written without any appearance of effort, and yet practically effective, display the characteristic qualities of their author's style. In 1834, when the whole series was complete, Miss Martineau paid a long visit to America. Here her open adhesion to the Abolitionist party, then small and very unpopular, gave great offense, which was deepened by the publication, soon after her return, of *Society in America* and a *Retrospect of Western Travel*. An article in the *Westminster Review*, "The Martyr Age of the United States," introduced English readers almost for the first time to the struggles of the Abolitionists. The American books were followed by a novel, *Deerbrook*. To the same period belong two or three little handbooks, forming parts of a *Guide to Service*.

In 1839, during a visit to the Continent, Miss Martineau's health, which had long been bad, broke down entirely. She retired to solitary lodgings in Tynemouth, and remained a prisoner to her couch till 1844. She was still busy, and, besides a novel (*The Hour and the Man*), published some tales for children, and *Life in the Sick-room*. In 1845 she published three volumes of *Forest and Game Law Tales*, in which the method of her political economy series was again applied. In 1849 she made an Eastern tour with some friends. She was abroad for eight months, visiting Egypt, Palestine, and Syria, and on her return published *Eastern Life*. She published about this time *Household Education*, expounding the modern theory, in which freedom and rationality, rather than command and obedience, are regarded as the most effectual instruments of education. At the request of Mr. Charles Knight she wrote for him, in 1849, *The History of the Thirty Years' Peace*—a characteristic instance of Miss Martineau's remarkable powers of labor.

In 1851 Miss Martineau edited a volume of *Letters on the Laws of Man's Nature and Development*. The new philosophical bent of her studies directed Miss

Martineau's attention to the works of Comte, and she undertook a condensed English version of the *Philosophie Positive*. It appeared in 1853, and to most readers is more useful and intelligible than the original. She had begun in the previous year to write articles, chiefly biographical, for the *Daily News*. Among these were the *Letters from Ireland*, written during a visit to that country in the summer of 1852. She also wrote a considerable number of essays upon different manufactures for *Household Words*, and another series for the same periodical upon the treatment of blindness, deafness, idiocy, etc., besides a *Guide to Windermere*, followed afterward by a *Complete Guide to the Lakes*. She had been for many years a contributor to the *Westminster Review*, and was one of the little band of supporters whose pecuniary assistance, in 1854, prevented its extinction or forced sale. In the early part of 1855 Miss Martineau found herself suffering from heart disease. Having always felt it one of her duties to write her autobiography, and believing the time before her to be but brief, she now at once set about this task, and on its completion caused the book to be printed that it might be ready for speedy publication at her death. But her life, which she supposed to be so near its close, was prolonged for other twenty years, her death not taking place until 1876.

MARTINI, GIOVANNI BATTISTA, the most learned musician of the eighteenth century, was born at Bologna on April 25, 1706. His father, Antonio Maria Martini, a violinist, taught him very early the elements of music, and to play the violin; at a later period he learned singing and harpsichord playing from Padre Pradieri, and counterpoint from Antonio Riccieri. Having received his education in classics from the fathers of the oratory of San Filippo Neri, he afterward entered upon a novitiate at the Franciscan monastery at Lago, at the close of which he was received into that order on September 11, 1722. Continuing his studies in the theory and practice of music with great zeal, he, in 1725, though only nineteen years of age, received the appointment of chapel-master in the Franciscan church at Bologna, where his compositions soon attracted much attention. At the invitation of amateurs and professional friends he now opened a school of musical composition, at which in the course of his long life several celebrated musicians were trained, including Paolucci, Sabbatini, Ruttini, Zanotti, Sarti, Ottani, and Stanislas Mattei; as a teacher he consistently declared his preference for the traditions of the old Roman school of musical composition. Padre Martini was a zealous and indefatigable collector of musical literature, and is alleged to have been the possessor of the most extensive musical library ever formed. After a lingering illness he died at Bologna on August 4, 1784.

MARTINI, SIMONE, called also Simone di Martino, and more commonly, but not correctly, Simon Memmi, was born in 1283. He followed the manner of painting proper to his native Siena, as improved by Duccio, which is essentially different from the style of Giotto and his school, and the idea that Simone was himself a pupil of Giotto is therefore wide of the mark. Died, 1344.

MARTINIQUE, one of the West India islands, belonging to the chain of the Lesser Antilles, and constituting a French colony, lies thirty-three miles south of Dominica and twenty-two north of Saint Lucia. The greatest length is forty-three miles, the mean width nineteen; and the surface comprises 244,090 acres, or 380 square miles. A cluster of volcanic mountains in the north, a similar group in the south, and a line of lower heights between them, form the backbone of the island, which culminates in the northwest in Mont Pelée, and has altogether a much more irregular and

strongly marked relief than it presents to the eye—the deep ravines and precipitous escarpments with which it abounds being reduced in appearance to gentle undulations by the drapery of the forests. Of the numerous streams which traverse the few miles of country between the watershed and the sea, about seventy or eighty are of considerable size, and in the rainy season become deep and too often destructive torrents. The east coast of the island, exposed to the full sweep of the Atlantic, is a succession of inlets, headlands, islands, and rocks; the south coast is much more regular, but bold and steep; and the west alone presents, in the bay of Fort de France, a stretch of mangrove swamp. Of the total area, about 83,990 acres are under cultivation, 83,843 occupied by forest and savanna, and 68,837 by fallow. On an average, according to the returns for 1874–78 inclusive, 47,440 acres are devoted to the sugar crop, 1,290 to coffee, 640 to cotton, and 1,660 to cocoa. Population, 180,000.

MARTINSBURG, a town situated in Clay township, Knox county, Ohio, seven miles south of Gambier, and about sixteen north of Newark. It has four churches, a union school, a tannery, a steam saw-mill, and a grist-mill. The census of 1890 gives the population at 6,247, an increase of 2,428 since 1880.

MARTINSBURG, the capital of Berkeley county, W. Va., is situated on Tuscarora Creek, in the Shenandoah Valley, eighty miles west of Washington. It contains a National and two other banks, carriage factories, foundries, distilleries, and machine-shops, has three newspapers, railroad and telegraph facilities, and a population of 7,200.

MARTIN'S FERRY, a village of Belmont county, Ohio, six miles north of Bellaire. It contains important glassworks, said to be the largest in the United States, and has two banks, manufactures of engines and agricultural implements, and foundries. Population, (1890), 6,200.

MARTIUS, CARL FRIEDRICH PHILIPP VON born in 1794, a well-known German botanist and traveler in Brazil. He studied in the university of Erlangen, and on graduating M.D. in 1814, published as his thesis a critical catalogue of plants in the botanic garden of the university. He afterward devoted himself to botanical study, and in 1817, he and Spix were sent to Brazil by the king of Bavaria. They traveled from Rio Janeiro through several of the southern and eastern provinces of Brazil, and ascended the river Amazon to Tabatinga, as well as some of its larger affluents. In 1820 they returned to Europe with rich collections of plants and animals, as also with stores of information on the geography, ethnology, and products of Brazil. In 1820 he was appointed conservator of the botanic garden at Munich, and in 1826, professor of botany in the university there, and held both offices till 1854, when he resigned them. He died in 1868.

MARTOS, a town of Spain, in the province of Jaen, is situated on the slope of a steep hill; which is surmounted by a ruined castle, sixteen miles west-southwest of Jaen. Population, 14,654.

MARTYN, HENRY, a celebrated missionary, was born at Truro, Cornwall, February 18, 1781. He died October 6, 1812.

MARTYROLOGY, a catalogue or list of martyrs, arranged according to the succession of their anniversaries, and sometimes including an account of their lives and sufferings. The corresponding word in the Greek Church is *Menologion* or *Analogion*; from the *Menologia* the *Synaxaria* are compiled. The custom of paying honor to the memory of those who had "witnessed the good confession" in perilous times established itself very

early in the Christian church, and one particular manner of commemoration was formally recognized by at least one ecclesiastical synod before the end of the fourth century.

MARULLUS, MICHAEL TARCHANIOTA, one of the most brilliant scholars of the golden age of Florentine learning, was born at Constantinople, and at an early age, on the fall of his native city, was brought to Ancona in Italy, where he became the intimate friend and pupil of Pontanus, with whom his name is associated by Ariosto. He was a soldier and a poet, and in the latter capacity published epigrams and *hymni naturales*. Marullus took no part in the work of translation, then so favorite an exercise of scholars, but he was understood to be planning some great work when he perished, April 10, 1500, in the river Cecina, near Volterra.

MARUM, MARTIN VAN, a distinguished Dutch man of science, born at Delft, in 1750. The work by which he is best known is his *Treatise on Electricity* (Groningen, 1776), in which all that had then been discovered in that science was carefully methodized. He died in 1837.

MARUTSE-MABUNDA, a kingdom in South Africa, with an area estimated at 123,590 square miles. It all belongs to the basin of the Zambesi, and by far the greater portion lies to the north of that river, which forms its southeastern boundary from the mouth of the Linyanti to the mouth of the Kafue, a distance of about 350 miles. The kingdom thus includes the main part of the territory formerly subject to the Makololo empire, which broke up on the death of Sekeletu in 1864.

MARVELL, ANDREW, was born on March 31, 1621, at the parsonage of Winestead in Holderness, England. He was educated at Hull grammar school by his father, who had obtained high position in that town, until his admission to Trinity College, Cambridge, on December 14, 1633. His first employment was in 1650, as tutor to Lord Fairfax's daughter. During his stay at Nunappleton were written the *Poems of the Country*, and some of the *Poems of Imagination and Love*. In 1652 he was in communication with Milton, to whom he had probably been introduced by Fairfax. Marvell accepted the Commonwealth as a practical fact, and the rule of Cromwell as the only guarantee for government at once tolerant and strong. But he never lost his belief in the monarchical theory. The assistant secretaryship opened the way to public life, and in 1658 Marvell was elected member for Kingston-upon-Hull in Richard Cromwell's parliament. From 1663 to 1665 he acted as secretary to Lord Carlisle's embassy to Muscovy, Sweden, and Denmark; and this is the only official post he ever filled during the reign of Charles. With the exception of this and of shorter unexplained intervals of travel, Marvell was constant in his parliamentary attendance to the day of his death.

During these years Marvell wrote a good deal of verse, chiefly satire, often very coarse, but always vigorous and full of an honest hatred of corruption. *The Growth of Popery and Arbitrary Power*, published in the year of his death, is a grave indictment of the conduct of ministers of the crown, and by implication, of Charles himself, since the Restoration. So shrewdly did this strike the conscience of the king that a proclamation, of which Marvell takes laughing notice, offered a large reward for the discovery of the author. As a political pamphleteer Marvell holds a high place; as a satirist he stands still higher. He died suddenly in 1678 on his return from Hull to take his seat in August. That he was poisoned, and at the instigation of the court, has been roundly asserted, naturally enough, though without the slightest foundation.

MARWAR. See JODHPUR.

MARY, the mother of Jesus, at the time when the gospel history begins, had her home in Galilee, at the village of Nazareth. Of her parentage nothing is recorded in any extant historical document of the first century, for the genealogy in Luke iii. is manifestly that of Joseph. In early life she became the wife of JOSEPH (*q.v.*) and also the mother of our Lord (see JESUS); that she afterward had other children is a natural inference from Matthew i. 25, which the evangelists, who frequently allude to "the brethren of the Lord," are at no pains to obviate. The few incidents mentioned in Scripture regarding her show that she followed our Lord to the very close of His earthly career with unflinching motherliness, but the "Magnificat" assigned to her in Luke i. is the only passage which would distinctly imply on her part a high prophetic appreciation of His divine mission. She was present at the crucifixion, where she was commended by Jesus to the care of the apostle John, Joseph having apparently died before this time. Mary is mentioned in Acts i. 14 as having been among those who continued in prayer along with the apostles at Jerusalem during the interval between the ascension and pentecost. There is no allusion in the New Testament to the time or place of her death.

It seems probable that the epithet ("Mother of God") was first applied to Mary by theologians of Alexandria toward the close of the third century; but it does not occur in any genuine extant writing of that period, unless we are to assign an early date to the apocryphal *Transitus Mariæ*, in which the word is of frequent occurrence. In the fourth century it is met with frequently, being used by Eusebius, Athanasius, Didymus, and Gregory of Nazianzus—the latter declaring that the man who believes not Mary to have been θεοτόκος has no part in God. If, as is not unlikely, its use was first recommended by a desire to bring into prominence the divinity of the Incarnate Word, there can be no doubt that latterly the expression came to be valued as directly honorable to Mary herself and as corresponding to the greatly increased esteem in which she personally was held throughout the Catholic world, so that, when Nestorius and others began to dispute its propriety in the following century, their temerity was resented, not as an attack upon the established orthodox doctrine of the Nicene creed, but as threatening a more vulnerable and more tender part of the popular faith. The causes which in the course of the preceding century led to this exaltation of the Mother of God in the esteem of the Catholic world are not far to seek. On the one hand the solution of the Arian controversy, however correct it may have been theoretically, undoubtedly had the practical effect of relegating the God-man redeemer for ordinary minds into a faraway region of "remote and awful Godhead," so that the need for a mediator to deal with the very Mediator could not fail to be felt. On the other hand, it must be accepted as a fact abundantly proved by history that the religious instincts of mankind are very ready to pay worship, in grosser or more refined forms, to the idea of womanhood: at all events many of those who became professing Christians at the political fall of paganism entered the church with such instincts (derived from the nature-religions in which they had been brought up) very fully developed. Probably it ought to be added that the comparative colorlessness with which the character of Mary is presented not only in the canonical gospels, but even in the most copious of the apocrypha, left greater scope for the untrammelled exercise of devout imagination than was possible in the case of Christ, in the circumstances of whose humiliation and in whose recorded utterances there were many things which the religious consciousness found difficulty in

understanding or in adapting itself to. At all events, from the time of the council of Ephesus, to exhibit figures of the Virgin and Child became the approved expression of orthodoxy, and the relationship of motherhood in which Mary had been formally declared to stand to God was instinctively felt to give the fullest and freest sanction of the church to that invocation of her aid which had previously been resorted to only hesitatingly and occasionally.

MARY I., queen of England, unpleasantly remembered as "the Bloody Mary" on account of the religious persecutions sanctioned under her reign, was a woman whose private history demands no less compassion than her policy as queen (if indeed it was her own) merits the condemnation of a more humane and tolerant age. She was the daughter of Henry VIII. and Catherine of Aragon, born in the earlier years of their married life, when as yet no cloud had darkened the prospect of Henry's reign. Her birth occurred at Greenwich, February 18, 1516, and she was baptized on the following Wednesday, Cardinal Wolsey standing as her godfather. She seems to have been a singularly precocious child, and is reported in July, 1520, when she was little more than four years of age, as entertaining some visitors by a performance on the virginals. When she was little over nine she was addressed in a complimentary Latin oration by commissioners sent over from Flanders on commercial matters, and replied to them in the same language "with as much assurance and facility as if she had been twelve years old." Her father, against whom it cannot be said that he depreciated learning, had taken care to give her an excellent education, and was proud of her achievements. About the same time that she replied to the commissioners in Latin he was arranging that she should learn Spanish, Italian, and French. A great part, however, of the credit of her early education was undoubtedly due to her mother, who not only consulted the Spanish scholar Vives upon the subject, but was herself Mary's first teacher in Latin. She was also well instructed in music, and among her principal recreations as she grew up was that of playing on the virginals and lute.

Mary was little more than two years old when she was proposed in marriage to the dauphin, son of Francis I. Three years afterward the French alliance was broken off, and she was affianced to her cousin the young emperor Charles V. by the treaty of Windsor. In 1526 a rearrangement was made of the royal household, and it was thought right to give Mary an establishment of her own along with a council on the borders of Wales, for the better government of the Marches. She was now proposed as a wife, not for the dauphin as before, but for his father Francis I., who had just been redeemed from captivity at Madrid, and who was only too glad of an alliance with England to mitigate the severe conditions imposed on him by the emperor. Wolsey, however, on this occasion, only made use of the princess as a bait to enhance the terms of the compact, and left Francis free in the end to marry the emperor's sister.

It was during this negotiation, as Henry afterward pretended, that the question was first raised whether Henry's own marriage with Catherine was a lawful one. (See HENRY VIII., *ante.*) The alliance itself, however, was actually concluded by a treaty dated Westminster, April 30, 1527, in which it was provided, as regards the Princess Mary, that she should be married either to Francis himself or to his second son Henry, duke of Orleans. But the real object was only to lay the foundation of a perfect mutual understanding between the two kings, which Wolsey soon after went to France to confirm.

During the next nine years the life of Mary, as well as that of her mother, was rendered miserable by the conduct of Henry VIII. in seeking a divorce. Her very life was in danger from the hatred of Anne Boleyn. Her health, moreover, was indifferent, and even when she was seriously ill, although Henry sent his own physician, Doctor Buttes, to attend her, he declined to let her mother visit her. So also, at her mother's death in January, 1536, she was forbidden to take a last farewell of her. But in May following another change occurred which seemed to promise some kind of relief. Anne Boleyn, the real cause of all her miseries, fell under the king's displeasure and was put to death. Mary was then urged to make a humble submission to her father as the means of recovering his favor, and after a good deal of correspondence with the king's secretary, Cromwell, she actually did so, and subscribed an act of submission, acknowledging the king as supreme, repudiating the pope's authority, and confessing that the marriage between her father and mother "was by God's law and man's law incestuous and unlawful."

No act, perhaps, in the whole of Henry's reign gives us a more painful idea of his revolting despotism. Mary was a high-spirited girl, and undoubtedly popular. All Europe looked upon her at that time as the only legitimate child of her father, but her father himself compelled her to disown the title and pass an unjust stigma on her own birth and her mother's good name. Nevertheless Henry was now reconciled to her, and gave her a household in some degree suitable to her rank. During the rest of the reign we hear little about her except in connection with a number of new marriage projects taken up and abandoned successively. Although she was still treated as of illegitimate birth, it was believed that the king, having obtained from parliament the extraordinary power to dispose of the crown by will, would restore her to her place in the succession, and three years before his death she was so restored by statute, but still under conditions to be regulated by her father's will.

Under the reign of her brother Edward VI. she was again subjected to severe trials, which at one time made her seriously meditate taking flight and escaping abroad. In spite of the forced declaration formerly rung from herself, no one really regarded her as a bastard, and the full recognition of her rights depended on the recognition of the pope as head of the church. Hence, when Edward's parliament passed an Act of Uniformity enjoining services in English and communion in both kinds, the law appeared to her totally void of authority, and she insisted on having mass in her own private chapel under the old form. When ordered to desist, she appealed for protection to the emperor, Charles V., who, being her cousin, intervened for some time not ineffectually, threatening war with England if her religious liberty was interfered with. But Edward's court was composed of factions of which the most violent eventually carried the day. Lord Seymour, the admiral, was attainted of treason and beheaded in 1549. His brother, the Protector Somerset, met with the same fate in 1552. Dudley, duke of Northumberland, then became paramount in the privy council, and easily obtained the sanction of the young king to those schemes for altering the succession which led immediately after his death to the usurpation of Lady Jane Grey. Dudley had, in fact, overawed all the rest of the privy council, and when the event occurred he took such energetic measures to give effect to the scheme that Lady Jane was actually recognized as queen for some days, and Mary had even to fly from Hoddesden into Norfolk. But the country was really devoted to her cause, as indeed her right in law was unquestion-

able, and before many days she was royally received in London, and took up her abode within the Tower.

Her first acts at the beginning of her reign displayed a character very different from that which she still holds in popular estimation. Her clemency toward those who had taken up arms against her was altogether remarkable. She released from prison Lady Jane's father, Suffolk, and had difficulty even in signing the warrant for the execution of Northumberland. Lady Jane herself she fully meant to spare, and did spare till after Wyatt's formidable insurrection. Following the emperor Charles V.'s guidance, she determined almost from the first to make his son Philip her husband, though she was eleven years his senior. She was also strongly desirous of restoring the old religion and wiping out the stigma of illegitimacy passed upon her birth, so that she might not seem to reign by virtue of a mere parliamentary settlement.

But the marriage promised to throw England into the arms of Spain and place the resources of the kingdom at the command of the emperor's son. The Commons sent her a deputation to entreat that she would not marry a foreigner, and when her resolution was known insurrections broke out in different parts of the country. Suffolk, whose first rebellion had been pardoned, proclaimed Lady Jane Grey again in Leicestershire, while young Wyatt raised the county of Kent, and actually besieged the queen in her own palace at Westminster. In the midst of the danger Mary showed great intrepidity, and the rebellion was presently quelled; after which, unhappily, she got leave to pursue her own course unchecked. She married Philip, restored the old religion, and got Cardinal Pole to come over and absolve the kingdom for its past disobedience to the Holy See.

The misgivings of those who had disliked the Spanish match were more than sufficiently justified by the course of events. Mary yielded a loyal and womanly devotion to a husband who did not too greatly esteem the treasure of her person. Her health, which was feeble before, was bad for the remainder of her days, and she fell under a delusion at first that it was owing to an approaching confinement. Disappointment and vexation probably added to her helplessness. The resources of the kingdom were at Philip's command, and he even took ships of the English fleet to escort his father, the emperor, on his abdication, to Spain. More extraordinary still, he ultimately succeeded in committing England to a war against France, when France had made an alliance with the pope against him as king of Spain; so the very marriage which was to confirm England in the old religion led to a war against the occupant of the see of Rome. And it was this war with France which produced the final calamity of the loss of Calais which sank so deeply into Mary's heart some months before she died.

The cruel persecution of the Protestants, which has cast so much infamy upon her reign, began about six months after her marriage; and it is not difficult to see that it was greatly due to the triumph of ideas imported from the land of the Inquisition. Rogers, the first of the martyrs, was burnt on February 4, 1555. Hooper, bishop of Gloucester, had been condemned six days before, and suffered the same fate upon the 9th. From this time the persecution went on uninterrupted for more than three years, numbering among its victims Ridley, Latimer, and Cranmer. It seems to have been most severe in the eastern and southern parts of England, and the largest number of sufferers was naturally in the diocese of Bonner, bishop of London. From first to last nearly 300 victims are computed to have perished at the stake; and their fate certainly created a revulsion

against Rome that nothing else was likely to have effected. How far Mary herself—who, during the most part of this time, was living in the strictest seclusion, sick in body and mind, hysterical and helpless—was personally answerable for these things, it is difficult to say. To her, no doubt, the propagators of heresy were the enemies of mankind, and she had little cause to love them from her own experience. Yet perhaps she hardly realized the full horror of what was done under her sanction. But there can be little doubt what effect it had upon the people; and when Mary breathed her last, on November 17, 1558, the event was hailed with joy as a national deliverance.

MARY II., queen of England, was the eldest daughter of James, duke of York (afterward James II. of England), by his first wife Anne Hyde, and was born in London on April 30, 1662. Having been educated in the Protestant faith, she was married to William, prince of Orange, on November 4, 1677. After the events of 1688 she followed her husband to England, and was proclaimed by the convention joint sovereign with him on February 13, 1689. She died of smallpox on December 28 (O.S.), 1694. (See WILLIAM III.)

MARY, queen of Scots, daughter of King James V. and his wife Mary of Lorraine, was born in December, 1542, a few days before the death of her father. On September 9th following, the ceremony of coronation was duly performed upon the infant. A scheme for her betrothal to Edward, prince of Wales, was defeated by the grasping greed of his father, whose obvious ambition to annex the crown of Scotland at once to that of England aroused instantly the general suspicion and indignation of Scottish patriotism. In 1548 the queen of six years old was betrothed to the dauphin Francis, and set sail for France, where she arrived on August 15th. The society in which the child was thenceforward reared is known to the readers of Brantôme as well as that of imperial Rome at its worst is known to readers of Suetonius or Petronius. Only in their pages can a parallel be found to the gay and easy record which reveals without sign of shame or suspicion of offense the daily life of a court compared to which the court of King Charles II. is as the court of Queen Victoria to the society described by Grammont. Debauchery of all kinds, and murder in all forms, were the daily matter of excitement or of jest to the brilliant circle which revolved around Queen Catherine de' Medici. After ten years' training under the tutelage of the woman whose main instrument of policy was the corruption of her own children, the queen of Scots, aged fifteen years and five months, was married to the eldest and feeblest of the brood on April 24, 1558. On November 17th Elizabeth became queen of England, and the princes of Lorraine—Francis the great duke of Guise, and his brother the cardinal—induced their niece and her husband to assume, in addition to the arms of France and Scotland, the arms of a country over which they asserted the right of Mary Stuart to reign as legitimate heiress of Mary Tudor. Civil strife broke out in Scotland between John Knox and the queen dowager—between the self-styled "congregation of the Lord" and the adherents of the regent, whose French troops repelled the combined forces of the Scotch and their English allies from the beleaguered walls of Leith, little more than a month before the death of their mistress in the castle of Edinburgh, on June 10, 1560. On August 25th Protestantism was proclaimed and Catholicism suppressed in Scotland by a convention of states assembled without the assent of the absent queen. On December 5th Francis II. died; in August, 1561, his widow left France for Scotland, having been refused a safe-conduct by Elizabeth on the ground of her own

previous refusal to ratify the treaty made with England by her commissioners in the same month of the preceding year. She arrived, nevertheless, in safety at Leith, escorted by three of her uncles of the house of Lorraine, and bringing in her train her future biographer, Brantôme, and Chastelard, the first of all her voluntary victims. On August 21st she first met the only man able to withstand her; and their first passage of arms left, as he has recorded, upon the mind of John Knox an ineffaceable impression of her "proud mind, crafty wit, and indurate heart against God and His truth."

By the influence of Lord James Stuart, in spite of the earnest opposition of Knox, permission was obtained for her to hear mass celebrated in her private chapel—a license to which, said the Reformer, he would have preferred the invasion of 10,000 Frenchmen. Through all the first troubles of her reign the young queen steered her skillful and dauntless way with the tact of a woman and the courage of a man. An insurrection in the north, headed by the earl of Huntly under pretext of rescuing from justice the life which his son had forfeited by his share in a homicidal brawl, was crushed at a blow by the Lord James. Exactly four months after the battle of Corrichie, and the subsequent execution of a criminal whom she is said to have "loved entirely," had put an end to the first insurrection raised against her, Pierre de Boscosel de Chastelard, who had returned to France with the other companions of her arrival, and in November, 1562, had revisited Scotland, expiated with his head the offense or the misfortune of a second detection at night in her bed-chamber. In the same month, twenty-five years afterward, the execution of his mistress, according to the verdict of her contemporaries in France, avenged the blood of a lover who had died without uttering a word to realize the apprehension which (according to Knox) had before his trial impelled her to desire her brother "that, as he loved her, he would slay Chastelard, and never let him speak word." And in the same month, two years from the date of Chastelard's execution, her first step was unconsciously taken on the road to Fotheringay, when she gave her heart at first sight to her kinsman Henry, Lord Darnley, son of Matthew Stuart, earl of Lennox, who had suffered an exile of twenty years in expiation of his intrigues with England, and had married the niece of King Henry VIII., daughter of his sister Margaret, the widow of James IV., by her second husband, the earl of Angus. Queen Elizabeth, with the almost incredible want of tact or instinctive delicacy which distinguished and disfigured her vigorous intelligence, had recently proposed as a suitor to the queen of Scots her own low-born favorite, Lord Robert Dudley, the widower if not the murderer of Amy Robsart; and she now protested against the project of marriage between Mary and Darnley. Mary, who had already married her kinsman in secret at Stirling Castle with Catholic rites celebrated in the apartment of David Rizzio, her secretary for correspondence with France, assured the English ambassador, in reply to the protest of his mistress, that the marriage would not take place for three months, when a dispensation from the pope would allow the cousins to be publicly united without offense to the church.

On July 29, 1565, they were accordingly remarried at Holyrood. The hapless and worthless bridegroom had already incurred the hatred of two powerful enemies, the earls of Morton and Glencairn; but the former of these took part with the queen against the forces raised by Murray, Glencairn, and others, under the nominal leadership of Hamilton, duke of Chatelherault, on the double plea of danger to the new religion of the country, and of the illegal proceeding by which Darnley had been proclaimed king of Scots without the needful con-

stitutional assent of the estates of the realm. Murray was cited to attend the "raid" or array levied by the king and queen, and was duly denounced by public blast of trumpet for his non-appearance. He entered Edinburgh with his forces, but failed to hold the town against the guns of the castle, and fell back upon Dumfries before the advance of the royal army, which was now joined by James Hepburn, earl of Bothwell, on his return from a three years' outlawed exile in France. He had been accused in 1562 of a plot to seize the queen and put her into the keeping of the earl of Arran, whose pretensions to her hand ended only when his insanity could no longer be concealed. Another new adherent was the son of the late earl of Huntly, to whom the forfeited honors of his house were restored a few months before the marriage of his sister to Bothwell. The queen now appealed to France for aid; but Castelnau, the French ambassador, replied to her passionate pleading by sober and earnest advice to make peace with the malcontents. This counsel was rejected, and in October, 1565, the queen marched an army of 18,000 men against them from Edinburgh; their forces dispersed in face of superior numbers, and Murray, on seeking shelter in England, was received with contumely by Elizabeth, whose half-hearted help had failed to support his enterprise, and whose intercession for his return found at first no favor with the queen of Scots. But the conduct of the besotted boy on whom at their marriage she had bestowed the title of king began at once to justify the enterprise and to play into the hands of all his enemies alike. His father set him on to demand the crown matrimonial, which would at least have assured to him the rank and station of independent royalty for life. Rizzio, hitherto his friend and advocate, induced the queen to reply by a reasonable refusal to this hazardous and audacious request. Darnley at once threw himself into the arms of the party opposed to the policy of the queen and her secretary—a policy which at that moment was doubly and trebly calculated to exasperate the fears of the religious and the pride of the patriotic. Mary was invited if not induced by the king of Spain to join his league for the suppression of Protestantism; while the actual or prospective endowment of Rizzio with Morton's office of chancellor, and the projected attainder of Murray and his allies, combined to inflame at once the anger and the apprehension of the Protestant nobles. According to one account, Darnley privately assured his uncle George Douglas of his wife's infidelity; he had himself, if he might be believed, discovered the secretary in the queen's apartment at midnight, under circumstances yet more unequivocally compromising than those which had brought Chastelard to the scaffold. A bond was drawn in which Darnley pledged himself to support the confederates who undertook to punish "certain privy persons" offensive to the state, "especially a stranger Italian called Davie." On March 9th the palace of Holyrood was invested by a troop under the command of Morton, while Rizzio was dragged by force out of the queen's presence and slain. The parliament was discharged by a proclamation issued in the name of Darnley as king; and in the evening of the next day the banished lords, whom it was to have condemned to outlawry, returned to Edinburgh. On the day following they were graciously received by the queen, who undertook to sign a bond for their security, but delayed the subscription till next morning under plea of sickness. During the night she escaped with Darnley, whom she had already seduced from the party of his accomplices, and arrived at Dunbar on the third morning after the slaughter of her favorite. From there they returned to Edinburgh on March 28th, guarded by 2,000 horsemen under the command of Bothwell, who had escaped

from Holyrood on the night of the murder, to raise a force on the queen's behalf with his usual soldierly promptitude. The slayers of Rizzio fled to England, and were outlawed; Darnley was permitted to protest his innocence and denounce his accomplices; after which he became the scorn of all parties alike, and few men dared or cared to be seen in his company. On June 19th a son was born to his wife, and in the face of his previous protestations he was induced to acknowledge himself the father. But, as Murray and his partisans returned to favor and influence no longer incompatible with that of Bothwell and Huntly, he grew desperate enough to dream of escape to France. This design was at once frustrated by the queen's resolution. She summoned him to declare his reasons for it in the presence of the French ambassador and an assembly of the nobles; she besought him for God's sake to speak out, and not spare her; and at last he left her presence with an avowal that he had nothing to allege. The favor shown to Bothwell had not yet given occasion for scandal, though his character as an adventurous libertine was as notable as his reputation for military hardihood; but as the summer advanced his insolence increased with his influence at court and the general aversion of his rivals. He was richly endowed by Mary from the greater and lesser spoils of the church; and the three wardenships of the border, united for the first time in his person, gave the lord high admiral of Scotland a position of unequaled power. In the gallant discharge of its duties he was dangerously wounded by a leading outlaw, whom he slew in single combat; and while yet confined to Hermitage Castle he received a visit of two hours from the queen, who rode thither from Jedburgh and back through twenty miles of the wild borderland, where her person was in perpetual danger from the freebooters. The result of this daring ride was a ten days' fever, after which she removed by short stages to Craigmillar, where a proposal for her divorce from Darnley was laid before her by Bothwell, Murray, Huntly, Argyle, and Lethington, who was chosen spokesman for the rest. She assented on condition that the divorce could be lawfully effected without impeachment of her son's legitimacy; whereupon Lethington undertook in the name of all present that she should be rid of her husband without any prejudice to the child, at whose baptism a few days afterward Bothwell took the place of the putative father, though Darnley was actually residing under the same roof, and it was not till after the ceremony that he was suddenly struck down by a sickness so violent as to excite suspicions of poison. He was removed to Glasgow, and left for the time in charge of his father; but on the news of his progress toward recovery a bond was drawn up for execution of the sentence of death which had secretly been pronounced against the twice-turned traitor who had earned his doom at all hands alike. On the 22d of the next month (January, 1567) the queen visited her husband at Glasgow and proposed to remove him to Craigmillar Castle, where he would have the benefit of medical baths; but instead of this resort he was conveyed on the last day of the month to the lonely and squalid shelter of the residence which was soon to be made memorable by his murder. Between the ruins of two sacred buildings, with the town-wall to the south and a suburban hamlet known to ill fame as the Thieves' Row to the north of it, a lodging was prepared for the titular king of Scotland. On the evening of Sunday, February 9th, Mary took her last leave of the miserable boy who had so often and so mortally outraged her as consort and as queen. That night the whole city was shaken out of sleep by an explosion of gunpowder which shattered to fragments the building

in which he should have slept and perished; and next morning the bodies of Darnley and a page were found strangled in a garden adjoining it, whither they had apparently escaped over a wall, to be dispatched by the hands of Bothwell's attendant confederates.

Upon the view which may be taken of Mary's conduct during the next three months depends the whole debatable question of her character. According to the professed champions of that character, this conduct was a tissue of such dastardly imbecility, such heartless irresolution, and such brainless inconsistency as forever to dispose of her time-honored claim to the credit of intelligence and courage. It is certain that just three months and six days after the murder of her husband she became the wife of her husband's murderer. On February 11th she wrote to the bishop of Glasgow, her ambassador in France, a brief letter of simple eloquence, announcing her providential escape from a design upon her own as well as her husband's life. A reward of £2,000 was offered by proclamation for discovery of the murderer. Bothwell and others, his satellites or the queen's, were instantly placarded by name as the criminals. Voices were heard by night in the streets of Edinburgh calling down judgment on the assassins. Four days after the discovery of the bodies, Darnley was buried in the chapel of Holyrood with secrecy as remarkable as the solemnity with which Rizzio had been interred there less than a year before. On the Sunday following, Mary left Edinburgh for Seton Palace, twelve miles from the capital. The demands of Darnley's father for justice on the murderers of his son were accepted and eluded by his daughter-in-law. Bothwell, with a troop of fifty men, rode through Edinburgh defiantly denouncing vengeance on his concealed accusers. As weeks elapsed without action on the part of the royal widow, while the cry of blood was up throughout the country, raising echoes from England and abroad, the murmur of accusation began to rise against her also. Murray, with his sister's ready permission, withdrew to France. Already the report was abroad that the queen was bent on marriage with Bothwell, whose last marriage with the sister of Huntly would be dissolved, and the assent of his wife's brother purchased by the restitution of his forfeited estates.

On March 28th the privy council, in which Bothwell himself sat, appointed April 12th as the day of his trial, Lennox, instead of the crown, being named as the accuser, and cited by royal letters to appear at "the humble request and petition of the said Earl Bothwell," who, on the day of the trial, had 4,000 armed men behind him in the streets, while the castle was also at his command. Under these arrangements it was not thought wonderful that Lennox discreetly declined the danger of attendance, even with 3,000 men ready to follow him, at the risk of desperate street fighting. He pleaded sickness, asked for more time, and demanded that the accused, instead of enjoying special favor, should share the treatment of other suspected criminals. But, as no particle of evidence on his side was advanced, the protest of his representative was rejected, and Bothwell, acquitted in default of witnesses against him, was free to challenge any persistent accuser to the ancient ordeal of battle. His wealth and power were enlarged by gift of the parliament which met on the 14th and rose on April 19th. On the second day following Mary went to visit her child at Stirling, where his guardian, the earl of Mar, refused to admit more than two women in her train. It was well known in Edinburgh that Bothwell had a body of men ready to intercept her on the way back, and carry her to Dunbar—not, as was naturally inferred, without good assurance of her consent. On April 24th, as she approached Edinburgh, Bothwell accordingly

met her at the head of 800 spearmen, assured her (as she afterward averred) that she was in the utmost peril, and escorted her, together with Huntly, Lethington, and Melville, who were then in attendance, to Dunbar Castle. On May 3d Lady Jane Gordon, who had become countess of Bothwell on February 22d of the year preceding, obtained, on the ground of her husband's infidelities, a separation which, however, would not under the old laws of Catholic Scotland have left him free to marry again; on the 7th, accordingly, the necessary divorce was pronounced, after two days' session, by a clerical tribunal which ten days before had received from the queen a special commission to give judgment on a plea of somewhat apocryphal consanguinity alleged by Bothwell as the ground of an action for divorce against his wife. On the day when the first or Protestant divorce was pronounced, Mary and Bothwell returned to Edinburgh with every prepared appearance of a peaceful triumph. Lest her captivity should have been held to invalidate the late legal proceedings in her name, proclamation was made of forgiveness accorded by the queen to her captor in consideration of his past and future services, and her intention was announced to reward them by further promotion; and on the same day (May 12th) he was duly created duke of Orkney and Shetland.

That the coarse and imperious nature of the hardy and able ruffian who had now become openly her master should no less openly have shown itself even in the first moments of their inauspicious union is what any bystander of common insight must inevitably have foreseen. Tears, dejection, and passionate expressions of a despair "wishing only for death," bore fitful and variable witness to her first sense of a heavier yoke than yet had galled her spirit and her pride. On June 6th or 7th Mary and Bothwell took refuge in Borthwick Castle, twelve miles from the capital, where the fortress was in the keeping of an adherent whom the diplomacy of Sir James Melville had succeeded in detaching from his allegiance to Bothwell. The fugitives were pursued and beleaguered by the earl of Morton and Lord Hume, who declared their purpose to rescue the queen from the thralldom of her husband. He escaped, leaving her free to follow him or to join the party of her professed deliverers. But whatever cause she might have found since marriage to complain of his rigorous custody and domineering brutality was insufficient to break the ties by which he held her. Alone, in the disguise of a page, she slipped out of the castle at midnight, and rode off to meet him at a tower two miles distant, whence they fled together to Dunbar. The confederate lords on entering Edinburgh were welcomed by the citizens, and after three hours' persuasion Lethington, who had now joined them, prevailed on the captain of the castle to deliver it also into their hands. Proclamations were issued in which the crime of Bothwell was denounced, and the disgrace of the country, the thralldom of the queen, and the mortal peril of her infant son were set forth as reasons for summoning all the lieges of the chief cities of Scotland to rise in arms on three hours' notice and join the forces assembled against the one common enemy. News of his approach reached them on the night of June 14th, and they marched before dawn with 2,200 men to meet him near Musselburgh. Mary meanwhile had passed from Dunbar to Haddington, and thence to Seton, where 1,600 men rallied to her side. On June 15th, one month from their marriage day, the queen and Bothwell, at the head of a force of fairly equal numbers but visibly inferior discipline, met the army of the confederates at Carberry Hill, some six miles from Edinburgh. Du Croc, the French ambassador, obtained permission through the influence of Mait-

land to convey to the queen the terms proposed by their leaders—that she and Bothwell should part, or that he should meet in single combat a champion chosen from among their number. At last it was agreed that the queen should yield herself prisoner, and Bothwell be allowed to retire in safety to Dunbar with the few followers who remained to him. Mary took leave of her first and last master with passionate anguish and many parting kisses.

In Edinburgh she was received by a yelling mob, which flaunted before her at each turn a banner representing the corpse of Darnley with her child beside it invoking on his knees the retribution of divine justice. At nine in the evening she was removed to Holyrood, and thence to the port of Leith, where she embarked under guard, with her attendants, for the island castle of Lochleven. On the 20th a silver casket containing letters and French verses, miscalled sonnets, in the handwriting of the queen, was taken from the person of a servant who had been sent by Bothwell to bring it from Edinburgh to Dunbar. Three days after this discovery Lord Lindsay, Lord Ruthven, and Sir Robert Melville were dispatched to Lochleven, there to obtain the queen's signature to an act of abdication in favor of her son, and another appointing Murray regent during his minority. She submitted, and a commission of regency was established till the return from France of Murray, who, on August 15th, arrived at Lochleven with Morton and Athole. The necessary removal of George Douglas from Lochleven enabled him to devise a method of escape for the prisoner on March 25, 1568, which was frustrated by detection of her white hands under the guise of a laundress. But a younger member of the household, Willie Douglas, aged eighteen, whose devotion was afterward remembered and his safety cared for by Mary at the time of utmost risk and perplexity to herself, succeeded on May 2d in assisting her to escape by a postern gate to the lake-side, and thence in a boat to the mainland, where George Douglas, Lord Seton, and others were awaiting her. Thence they rode to Seton's castle of Niddry, and next day to Hamilton Palace, round which an army of 6,000 men was soon assembled, and whither the new French ambassador to Scotland hastened. The queen's abdication was revoked, messengers were dispatched to the English and French courts, and word was sent to Murray at Glasgow that he must resign the regency, and should be pardoned in common with all offenders against the queen. But on the day when Mary arrived at Hamilton, Murray had summoned to Glasgow the feudatories of the crown, to take arms against the insurgent enemies of the infant king. Elizabeth sent conditional offers of help to her kinswoman, provided she would accept of English intervention and abstain from seeking foreign assistance; but the messenger came too late. Mary's followers had failed to retake Dunbar Castle from the regent, and made for Dumbarton instead, marching two miles south of Glasgow, by the village of Langside. Here Murray, with 4,500 men, under leaders of high distinction, met the 6,000 of the queen's army.

On May 13th, the battle or skirmish of Langside determined the result of the campaign in three-quarters of an hour. Kirkaldy of Grange, who commanded the regent's cavalry, seized and kept the place of vantage from the beginning, and at the first sign of wavering on the other side shattered at a single charge the forces of the queen, with a loss of one man to three hundred. Mary fled sixty miles from the field of her last battle before she halted at Sanquhar. On the third day from the rout of Langside she crossed the Solway, and landed at Workington, in Cumberland, May 16, 1568. On the

20th, Lord Scrope and Sir Francis Knollys were sent from court to carry messages and letters of comfort from Elizabeth to Mary at Carlisle. On July 15th, after various delays interposed by her reluctance to leave the neighborhood of the border, where on her arrival she had received the welcome and the homage of the leading Catholic houses of Northumberland and Cumberland, she was removed to Bolton Castle in North Yorkshire. During her residence here a conference was held at York between her own and Elizabeth's commissioners and those appointed to represent her son as king of Scots. These latter, of whom Murray himself was the chief, privately laid before the English commissioners the contents of the famous casket. On October 24th, the place of the conference was shifted from York to London, where the inquiry was to be held before Queen Elizabeth in council. Mary was already aware that the chief of the English commissioners, the duke of Norfolk, was secretly an aspirant to the peril of her hand; and on October 21st, she gave the first sign of assent to the suggestion of a divorce from Bothwell. On October 26th, the charge of complicity in the murder of Darnley was distinctly brought forward against her in spite of Norfolk's reluctance and Murray's previous hesitation. Elizabeth, by the mouth of her chief justice, formally rebuked the audacity of the subjects who durst bring such a charge against their sovereign, and challenged them to advance their proofs. They complied by the production of an indictment under five heads, supported by the necessary evidence of documents. The number of English commissioners was increased, and they were bound to preserve secrecy as to the matters revealed. Further evidence was supplied by Thomas Crawford, a retainer of the house of Lennox, tallying so exactly with the text of the casket letters as to have been cited in proof that the latter must needs be a forgery. Elizabeth, on the close of the evidence, invited Mary to reply to the proofs alleged before she could be admitted to her presence; but Mary simply desired her commissioners to withdraw from the conference. She declined with scorn the proposal made by Elizabeth through Knollys, that she should sign a second abdication in favor of her son. On January 10, 1569, the judgment given at the conference acquitted Murray and his adherents of rebellion, while affirming that nothing had been proved against Mary—a verdict accepted by Murray as equivalent to a practical recognition of his office as regent for the infant king. This position he was not long to hold; and the fierce exultation of Mary at the news of his murder gave to those who believed in her complicity with the murderer, on whom a pension was bestowed by her unblushing gratitude, fresh reason to fear, if her liberty of correspondence and intrigue were not restrained, the likelihood of a similar fate for Elizabeth. On January 26, 1569, she had been removed from Bolton Castle to Tutbury in Staffordshire, where proposals were conveyed to her, at the instigation of Leicester, for a marriage with the duke of Norfolk, to which she gave a graciously conditional assent; but the discovery of these proposals consigned Norfolk to the Tower, and on the outbreak of an insurrection in the north, Mary, by Lord Hunsdon's advice, was again removed to Coventry, when a body of her intending deliverers was within a day's ride of Tutbury. On January 23d following, Murray was assassinated; and a second northern insurrection was crushed in a single sharp fight by Lord Hunsdon. In October Cecil had an interview with Mary at Chatsworth, when the conditions of her possible restoration to the throne in compliance with French demands were debated at length. The queen of Scots, with dauntless dignity, refused to yield the castles of Edinburgh and Dumbarton into

English keeping, or to deliver up her fugitive English partisans then in Scotland; upon other points they came to terms, and the articles were signed October 16th. On the same day Mary wrote to Elizabeth, requesting with graceful earnestness the favor of an interview which might reassure her against the suggestion that this treaty was a mere pretense. On November 28th she was removed to Sheffield Castle, where she remained for the next fourteen years in charge of the earl of Shrewsbury. The detection of a plot, in which Norfolk was implicated, for the invasion of England by Spain on behalf of Mary, who was then to take him as the fourth and most contemptible of her husbands, made necessary the reduction of her household and the stricter confinement of her person. On May 28, 1572, a demand from both houses of parliament for her execution as well as Norfolk's was generously rejected by Elizabeth.

A treaty projected on the news of the massacre of St. Bartholomew, by which Mary should be sent back to Scotland for immediate execution, was broken off by the death of the earl of Mar, who had succeeded Lennox as regent; nor was it found possible to come to acceptable terms on a like understanding with his successor Morton, who in 1577 sent a proposal to Mary for her restoration, which she declined, in suspicion of a plot laid to entrap her by the policy of Sir Francis Walsingham, the most unscrupulously patriotic of her English enemies, who four years afterward sent word to Scotland that the execution of Morton, so long the ally of England, would be answered by the execution of Mary. But on that occasion Elizabeth again refused her assent either to the trial of Mary or to her transference from Sheffield to the Tower. In 1581 Mary accepted the advice of Catherine de' Medici and Henry III. that she should allow her son's title to reign as king of Scotland conjointly with herself when released and restored to a share of the throne. This plan was but part of a scheme including the invasion of England by her kinsman the duke of Guise, who was to land in the north and raise a Scottish army to place the released prisoner of Sheffield beside her son on the throne of Elizabeth. After the overthrow of the Scottish accomplices in this notable project, Mary poured forth upon Elizabeth a torrent of pathetic and eloquent reproach for the many wrongs she had suffered at the hands of her hostess, and pledged her honor to the assurance that she now aspired to no kingdom but that of heaven. In the spring of 1583 she retained enough of this saintly resignation to ask for nothing but liberty, without a share in the government of Scotland. In the autumn of 1584 she was removed to Wingfield Manor under charge of Sir Ralph Sadler and John Somers, who accompanied her also on her next removal to Tutbury in January, 1585.

On Christmas Eve she was removed from the hateful shelter of Tutbury to the castle of Chartley in the same county. Her correspondence in cipher from there with her English agents abroad, intercepted by Walsingham and deciphered by his secretary, gave eager encouragement to the design for a Spanish invasion of England under the prince of Parma. Anthony Babington, in his boyhood a ward of Shrewsbury, resident in the household at Sheffield Castle, and thus subjected to the charm before which so many victims had already fallen, was now induced to undertake the deliverance of the queen of Scots by the murder of the queen of England. On September 25th she was removed to the strong castle of Fotheringay, in Northamptonshire. On October 6th she was desired by letter from Elizabeth to answer the charges brought against her before certain of the chief English nobles appointed to sit in commission on the cause. In spite of her first refusal to submit, she was induced by the arguments of the vice-

chamberlain, Sir Christopher Hatton, to appear before this tribunal on condition that her protest should be registered against the legality of its jurisdiction over a sovereign, the next heir of the English crown.

On October 14 and 15, 1586, the trial was held in the hall of Fotheringay Castle. Alone, "without one counselor on her side among so many," Mary conducted the whole of her own defense. Pathos and indignation, subtlety and simplicity, personal appeal and political reasoning, were the alternate weapons with which she fought against all odds of evidence or inference, and disputed step by step every inch of debatable ground. She repeatedly insisted on the production of proof in her own handwriting as to her complicity with the project of the assassins who had expiated their crime on the 20th and 21st of the month preceding. When the charge was shifted to the question of her intrigues with Spain, she took her stand resolutely on her right to convey whatever right she possessed, though now no kingdom was left her for disposal, to whomsoever she might choose. One single slip she made in the whole course of her defense; but none could have been more unluckily characteristic and significant. When Burghley brought against her the unanswerable charge of having at that moment in her service, and in receipt of an annual pension, the instigator of a previous attempt on the life of Elizabeth, she had the unwary audacity to cite in her justification the pensions allowed by Elizabeth to her adversaries in Scotland, and especially to her son. It is remarkable that just two months later, in a conversation with her keepers, she again made use of the same extraordinary argument in reply to the same inevitable imputation, and would not be brought to admit that the two cases were other than parallel.

Finally she demanded, as she had demanded before, a trial either before the estates of the realm lawfully assembled, or else before the queen in council. So closed the second day of the trial; and before the next day's work could begin a note of two or three lines hastily written at midnight informed the commissioners that Elizabeth had suddenly determined to adjourn the expected judgment and transfer the place of it to the star-chamber. Here, on October 25th, the commissioners again met; and one of them alone, Lord Zouch, dissented from the verdict by which Mary was found guilty of having, since June 1st, preceding, compassed and imagined divers matters tending to the destruction of Elizabeth. This verdict was conveyed to her, about three weeks later, by Lord Buckhurst and Robert Beale, clerk of the privy council. At the intimation that her life was an impediment to the security of the received religion, "she seemed with a certain unwonted alacrity to triumph, giving God thanks, and rejoicing in her heart that she was held to be an instrument" for the restoration of her own faith. This note of exultation as in martyrdom was maintained with unflinching courage to the last. She wrote to Elizabeth and the duke of Guise two letters of almost matchless eloquence and pathos, admirable especially for their loyal and grateful remembrance of all her faithful servants. Between the date of these letters and the day of her execution well nigh three months of suspense elapsed. Elizabeth, fearless almost to a fault in face of physical danger, constant in her confidence even after discovery of her narrow escape from the poisoned bullets of household conspirators, was cowardly even to a crime in face of subtler and more complicated peril. She rejected with resolute dignity the intercession of French envoys for the life of the queen-dowager of France; she allowed the sentence of death to be proclaimed, and welcomed with bonfires and bell-ringing throughout the length of England; she yielded a res-

pite of twelve days to the pleading of the French ambassador, and had a charge trumped up against him of participation in a conspiracy against her life; at length, on February 1, 1587, she signed the death-warrant, and then made her secretaries write word to Paulet of her displeasure that in all this time he should not, of himself, have found out some way to shorten the life of his prisoner, as in duty bound by his oath, and thus relieve her singularly tender conscience from the guilt of bloodshed. Paulet, with loyal and regretful indignation, declined the disgrace proposed to him in a suggestion "to shed blood without law or warrant;" and on February 7th the earls of Shrewsbury and Kent arrived at Fotheringay with the commission of the council for execution of the sentence given against his prisoner. Mary received the announcement with majestic tranquillity, expressing in dignified terms her readiness to die, her consciousness that she was a martyr for her religion, and her total ignorance of any conspiracy against the life of Elizabeth. At night she took a graceful and affectionate leave of her attendants, distributed among them her money and jewels, wrote out in full the various legacies to be conveyed by her will, and charged her apothecary Gorion with her last messages for the king of Spain. In these messages the whole nature of the woman was revealed. Not a single friend, not a single enemy, was forgotten; the slightest service, the slightest wrong, had its place assigned in her faithful and implacable memory for retribution or reward. Forgiveness of injuries was as alien from her fierce and loyal spirit as forgetfulness of benefits; the destruction of England and its liberties by Spanish invasion and conquest was the strongest aspiration of her parting soul. At eight next morning she entered the hall of execution, having taken leave of the weeping envoy from Scotland, to whom she gave a brief message for her son; took her seat on the scaffold, listened with an air of even cheerful unconcern to the reading of her sentence, solemnly declared her innocence of the charge conveyed in it and her consolation in the prospect of ultimate justice, rejected the professional services of Richard Fletcher, dean of Peterborough, lifted up her voice in Latin against his in English prayer, and when he and his fellow-worshippers had fallen duly silent prayed aloud for the prosperity of her own church, for Elizabeth, for her son, and for all the enemies whom she had commended overnight to the notice of the Spanish invader; then, with no less courage than had marked every hour and every action of her life, received the stroke of death from the wavering hand of the headsman.

MARYBOROUGH, a town of Queensland, Australia, in the county of March, on the left bank of the Mary river, twenty-five miles from its mouth, about 180 miles north of Brisbane.

MARYLAND, one of the thirteen original States of the Union, was first settled in 1634 by English Roman Catholics under Leonard Calvert, a brother of Lord Baltimore, who had obtained a charter from Charles I., of England. Unlike the Puritan colonists of New England, the early settlers of Maryland enacted laws granting toleration to all forms of religious belief. The early history was greatly disturbed by conflicts between Lord Baltimore's party and the traders who claimed under William Claiborne of Virginia. The proprietary party finally established their power. In 1688 Lord Baltimore's deputies declined to proclaim William and Mary, and the result was a revolt which led to the overthrow of the feudal system, and Maryland became a crown colony. The Church of England was then established and disabilities were imposed upon Catholics and dissenters. In 1714 one of the Baltimore family became a

Protestant and was recognized as the proprietor, and from this time until 1776 the Baltimores held possession. The original charter limits of Maryland, which was named after Henrietta Maria, queen of Charles I., included all of Delaware and a considerable part of Pennsylvania, and conflicted with the grant to William Penn. The controversy between the two colonies lasted from 1682 to 1760, when the Penn heirs proved successful and Maryland assumed its present limits, and Mason and Dixon's line was established to mark the boundaries in 1763-67.

In the war of Independence Maryland bore a conspicuous part and furnished 20,636 men to the Continental armies. In the war of 1812-14, the State had in the service no less than 42,636 men, a number only exceeded by the great States of New York and Virginia. In the war with Mexico Maryland's contribution was 2,500 men. From the beginning to the close of the war for the Union, the number of organizations put into the service of the United States were three regiments, two battalions, and one independent company of cavalry, six batteries of light artillery, and nineteen regiments and one independent company of infantry. There were also three incomplete regiments, which, having failed to perfect an organization, were consolidated with other commands. The enlistments in the naval service and marine corps, added to the military force, give a grand aggregate of 48,855 men furnished by this State to the Union forces. Of this number 44,973 were volunteers, 1,426 drafted men, and 2,456 substitutes. Reduced to a three years' standard this force aggregated 41,275 men.

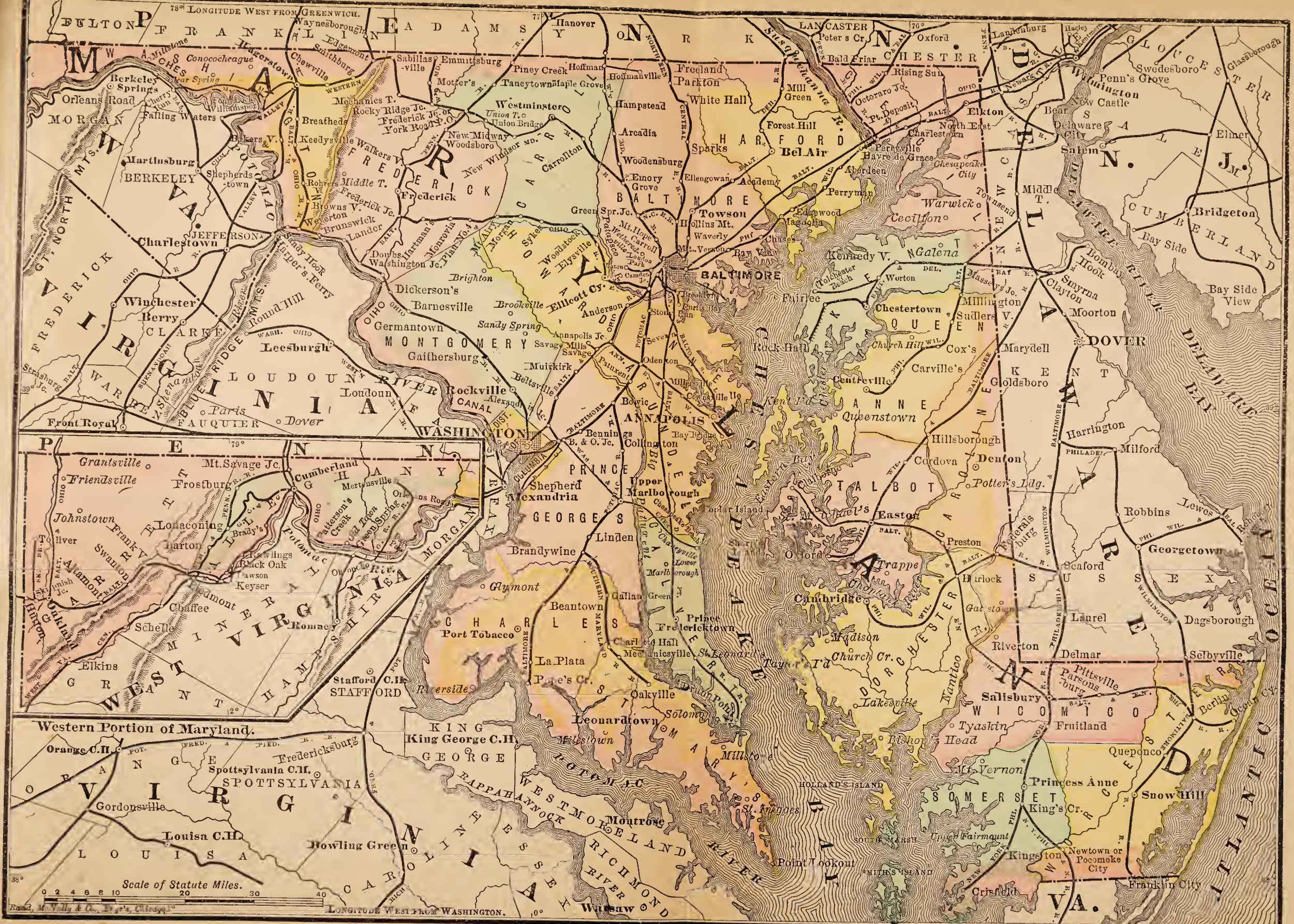
Maryland contributed to the Confederate army, it is estimated, about 12,000 men, scattered through 100 commands.

Maryland occupies an exceptional position among the States of the Union. Midway between the two great sections of the Atlantic seaboard, the north and south, it partakes, to some extent, of the characteristics of each State. The extreme length of the State from east to west is 190 miles, and greatest breadth about 120 miles. Its area (excluding the Chesapeake Bay) is 11,124 square miles. According to the census of 1880, the total population of the State was 934,632, and the United States census of 1890 returned it at 1,042,390. The census of 1880 disclosed the fact that there were in the State 462,004 males, 472,628 females, 851,984 natives, 82,648 foreign born, 724,718 white persons, and 209,914 colored. The assessed valuation of real and personal estate, according to the census of 1880, was \$459,187,408.

The climate of Maryland is mild and free from prolonged extremes of heat and cold, the soil is naturally kind and fertile, and most of it easily tilled and adapted to a great variety of products.

The great Chesapeake Bay, which forms a vast natural basin into which flow the waters of many noble rivers, divides the State into two sections—the Eastern and Western shores—of which the latter is much the greater, in both area and variety of resources. The Eastern shore, however, from its advantages of location, having quick rail communication with Baltimore, Philadelphia, and New York, and facilities of transportation by water to Baltimore, has made rapid strides during the past two decades. Curiously enough, the oldest section of the State, Southern Maryland, which was the seat of the first settlement of Lord Baltimore, is the one which is the most backward in progress, owing mainly to the lack of transportation facilities.

Western Maryland presents a greater variety of resources than any other section of the State. Its surface is broken by mountain ranges, which divide it into charming valleys, with fine, undulating stretches of country at the base of the mountains, affording unsur-



passed agricultural lands, besides extensive deposits in the mountains, of coal and iron. The bituminous coal of the George's Creek region is a vast source of wealth, and gives employment to many thousands of miners, whose labor has built up a number of thriving towns and villages. There are several coal-fields with horizontal seams lying near the surface, but the most considerable is that of the George's Creek valley between Dan's Mountain on the east and Savage Mountain on the west. This narrow valley, about twenty miles long, contains the "big seam" of bituminous coal, of the extraordinary thickness of fourteen feet. The number of tons mined was 2,261,918, and it is estimated that 550 square miles of Coal-measures remain. Maryland has first-class railroad communication, the Baltimore and Ohio Railroad, incorporated in 1827, being the earliest of the great trunk lines. The Chesapeake and Ohio and the Chesapeake and Delaware canals, are two most important works and of great use to commerce.

The State is divided into twenty-three counties and the corporation of Baltimore City. The latter is the capital, and other important cities are Cumberland, Frederick, Hagerstown and Annapolis.

The total debt of the State on January 1, 1890, was \$10,370,535, and after deducting productive investments and cash on hand, the net debt was \$4,339,280. The assessed value of property for State levy in 1889 was \$477,398,380, and the tax-levy was 17 $\frac{3}{4}$ cents on each \$100.

The total revenue received into the treasury during the fiscal year 1889 was \$2,067,343.71, and the balance in the treasury September 30, 1888, was \$532,069.46, making the total amount in the treasury during the fiscal year \$2,599,413.17.

The total disbursements during the fiscal year 1889 were \$2,188,686.16, and the balance in the treasury at the end of the fiscal year was \$410,727.01.

Maryland has an excellent system of public education. In 1889 the number of schools was 2,200, with an enrollment of 179,460 pupils and an average daily attendance of 99,220. The receipts for school purposes from all sources were, in 1889, \$1,819,352, and the total expenses were \$1,835,030.

The commercial and manufacturing interests of Maryland are largely centered at Baltimore. (See vol. ii., pages 766-767.) The agricultural returns furnished by the United States Department of Agriculture are as follows:

Products.	Quantity produced in 1887.	Number of acres in each crop.	Total valuation.
Indian corn.....bushels	19,415,000	719,073	\$8,736,750
Wheat..... " "	5,797,000	562,836	4,811,510
Rye..... " "	265,000	30,443	145,750
Oats..... " "	2,438,000	117,798	804,540
Buckwheat..... " "	131,000	10,894	70,740
Potatoes..... " "	1,323,000	20,994	727,650
Tobacco.....pounds	26,603,000	41,697	1,463,148
Hay.....tons	404,906	323,925	4,636,174
Total.....		1,827,660	21,396,262

MARYPORT, a market and seaport town of Cumberland, England, is situated on the Irish Sea, twenty-nine miles southwest from Carlisle. Population, 9,000.

MARYVILLE, a Missouri town, in Nodaway county, of which it is the capital, lies on the Kansas City, St. Joseph and Council Bluffs Railroad, forty-five miles from St. Joseph. It has banks, telegraphs, churches, schools, newspapers, flouring and saw mills, and considerable trade with the surrounding country. Population 1890), 4,017.

MARYSVILLE, a handsome little California town, the capital of Yuba county, lies on the Feather river, near its junction with the Yuba. It has considerable trade and varied manufactures, together with ample railroad, banking, and telegraph facilities. The town has several newspapers, numerous churches, and exceptionally good educational advantages. Gold is mined in the surrounding country. A line of steamers connects the city of Sacramento with Marysville. Population of Marysville (1890), 3,936.

MASACCIO. Tommaso Guidi, an Italian painter, was born in 1402, and is said to have studied under his contemporary, Masolino da Panicale. In 1421, or perhaps 1423, he was enrolled in the guild of the *speziali* (druggists) in Florence; in 1425, in the guild of painters. His first attempts in painting were made in Florence, and then in Pisa. Next he went to Rome, where he became prominent. In 1427 Masaccio was living in Florence with his mother, then for the second time a widow, and with his younger brother Giovanni, a painter of no distinction; he possessed nothing but debts. In 1428 he was working in the Brancacci chapel. Before the end of that year he disappeared from Florence, going, as it would appear, to Rome, to evade the importunities of creditors. Immediately afterward, in 1429, when his age was twenty-seven, he was reported dead. Poisoning by jealous rivals in art was rumored, but of this nothing is known.

MASANIELLO (an abbreviation of TOMMASO ANIELLO or ANELLO) was the leader of the Neapolitan revolt in July, 1647. For many years the Spanish Government had exacted large sums from the Two Sicilies, although the privileges granted by Ferdinand and Charles V. had exempted them both from taxes. Under Philip III. and Philip IV., the exactions, heavy in themselves, were made more oppressive by being farmed out to contractors, while the sums raised were usually conveyed to Spain and spent on purposes often having no connection with Naples. Meantime the industrial classes were scourged by the excesses of the nobility and the lawlessness of banditti. At the end of 1646, the duke of Arcos demanded a million ducats in gold; and it was resolved after much opposition to raise it from fruit, one of the most important articles of food to a southern people. Petitions delayed but did not remove the tax; on June 6th a toll-house was blown up, but the viceroy did not give way. The discontent was fomented by Genovino, who had been chosen "elect of the people." He selected for his purpose Masaniello, a fisherman of Naples, then twenty-seven years old, well built, intelligent, and very popular in the city. On July 16th, the feast of S. Maria del Carmine, it was customary to make a sort of castle which was defended by one body of youths armed with sticks and stormed by another. Masaniello had been chosen captain of one of these parties, and got together four hundred young men, with whom he had already raised the cry of "Down with the taxes" when the crisis was precipitated by a quarrel. On Sunday, the 7th, a dispute arose in the market (on which Masaniello's house looked), whether the gardeners or the buyers of their fruit should pay the tax. Finally the owner of the fruit (said to have been a kinsman of Masaniello) upset his basket, saying he would sooner let the people have it for nothing than pay the tax. Masaniello came up; the tax-collectors were pelted with fruit and then with stones, and the toll-house was burned with cries of "The king of Spain and plenty; down with misgovernment and taxes." The viceroy attempted to quiet the people by promises; his carriage was surrounded, and he escaped with difficulty to St. Elmo. Meanwhile the populace broke open the prisons, and

released all charged with offenses against the customs. In the evening, by advice of Genovino, a meeting elected officers, and decided on their demands. Masaniello was chosen captain, with one Perrone as his lieutenant.

The cardinal archbishop Filomarino did his best to mediate between the parties all through. The seizure of arms went on, and Masaniello, marching out of the city, disarmed and took prisoners 400 soldiers, while another body of people did the same with 600 German mercenaries. The castle being short of provisions, Masaniello sent some as a present to the viceroy. The Neapolitan galleys, under Gianettino Doria, arrived the same day, and Masaniello refused permission to land or to come nearer than a mile to the shore, but sent provisions on board. In fact he was now undisputed master of the city, not only organizing the military force in it with surprising ability, but dispensing strict though severe justice. Often he sat inside his little house on the market, sword or loaded gun in hand, while petitions and complaints were handed to him on the end of a pike through the window; yet he still went barefoot, dressed as a simple fisherman. The people having assembled consulted together on the terms of agreement; it was settled by the advice of Genovino that Masaniello should show the articles agreed on to the duke at the palace, and that the viceroy should afterward swear to them in the cathedral. Toward evening the procession set out, Masaniello in a dress of cloth of silver pressed upon him by the archbishop. An immense concourse of armed men, estimated at 140,000, lined the way or accompanied him. Before entering the palace he exhibited the charter brought by the archbishop, and charged them not to lay down their arms till they had received the confirmation of their rights from the king of Spain. "If I do not return in an hour," he added, "wreck the city." He was received by the viceroy as an equal. All the conditions were agreed to, the chief being that the elect of the people should have as many votes as the nobles; that all taxes should be removed except those already existing in Charles V.'s time; that the viceroy should set the articles ratified by the king within three months; that no punishment should be inflicted on those who had taken part in the rising; and that the people should keep their arms till the ratification. On the Friday Masaniello dismissed most of his followers to their work, keeping a patrol of four men and a corporal in each street. Next day the ceremony in the cathedral took place; the duke of Canjano read the articles, Masaniello meanwhile correcting and explaining, and the viceroy solemnly swore to observe them. Then Masaniello tore off his rich dress; it was time, he said, to return to his fish. And indeed from this time began his ruin. For a week the care of a city, with hundreds of thousands of inhabitants, had rested upon him; he had been general, judge, legislator, and during the whole time he had hardly slept or eaten, the latter through dread of poison; no wonder if the fisherman's brain reeled under all this. His justice had been severe, but hitherto it had struck men who deserved punishment, the oppressor, the robber, the hired cut-throat; henceforth everyone who ventured to contradict him risked his life, and the only man who could persuade him to mercy was the good archbishop. Five hundred in all, it is said, were put to death by his order; though it is probable that they were few compared to the lives taken a short time afterward by the viceroy in defiance of his plighted word.

On Tuesday, the 16th, the feast of S. Maria del Carmine, Masaniello went up into the pulpit, and in a wild harangue recapitulated his services. He knew, he said, his death was near at hand; then tearing open his dress

he showed his body emaciated by fatigue and want of food. After some more wild talk he was disarmed and confined in a monastery. There the quiet seems to have restored him; but his assassins soon broke in; he turned to meet them; five shots were at once fired, and he fell dead. His head was cut off and carried through the streets, while his body was dragged about the city for awhile and then buried outside the city.

MASAYA, a town in Nicaragua, Central America, on the east side of the Lake of Masaya, about fifty-five miles southeast of Managua, and twenty-five miles northwest of Granada. The population, mostly of Indian blood, is estimated at 15,000 or 18,000.

MASCARA, a fortified town of Algeria, in the province of Oran, sixty miles southeast of Oran, lies at a height of 1,900 feet above the sea, on the southern slope of the first chain of the Atlas mountains, and occupies two small hills separated by the Oued Toudman. Population, 10,000.

MASCARENE ISLANDS, or MASCARENHAS, a group in the Indian Ocean to the east of Madagascar, consisting of Mauritius (Île de France), Réunion (Bourbon), and Rodriguez. Mauritius and Rodriguez belong to Great Britain, Réunion to France. The collective title is derived from the Portuguese navigator, Garcia Mascarenhas, by whom Bourbon, at first called Mascarenhas, was discovered in 1505.

MASCARON, JULES, French pulpit orator, was born at Marseilles in 1634, and died at his diocesan city of Agen in 1703.

MASCHERONI, LORENZO, an Italian geometer, was professor of mathematics at the university of Pavia, and published a variety of mathematical works. He was born in 1750 and died in 1800.

MASINISSA, a Numidian prince whose history is closely intertwined with that of the wars between Rome and Carthage. With true barbarian fickleness, and a keen eye to his own interests, he espoused now one side, now the other, inclining however on the whole decidedly in favor of Rome, so much so indeed as to be spoken of by Roman orators and historians as "a most faithful ally of the Roman people." He was the son of a Numidian king or chief, Gala, whose dominions coincided with the eastern portions of Numidia, and thus bordered on Carthaginian territory, or what is now Tunis.

MASK, or MASQUE. See DRAMA.

MASKELYNE, NEVIL, astronomer-royal at Greenwich for nearly half a century, was born in London October 6, 1732. The great solar eclipse of 1748 seems to have made a deep impression upon him; and after studying divinity at Trinity College, Cambridge, of which he was elected a fellow in 1756, he determined to devote himself wholly to astronomy. He early became intimate with Bradley, and in 1761 was deputed by the Royal Society to make observations of the transit of Venus at St. Helena. During the voyage he introduced into navigation the determination of longitude by lunar distances, a method which Mayer's recently published tables had made practically possible. In 1763 he undertook a voyage to Barbados to test Harrison's watches, which, however, he reported to be inferior to the method of lunars for determining longitude. In 1765 he succeeded Bliss as astronomer-royal, and thereafter devoted himself with singular energy to the duties of his office, which he held till his death, February 9, 1811.

MASKINONGE. See PIKE.

MASOLINO DA PANICALE. Masolino was said to have been born at Panicale di Valdelsar, near Florence, or more probably in Florence itself, in 1383; his death took place later than 1429, perhaps as late as



1440. The only works which can with certainty be assigned to him are a series of wall paintings executed toward 1428, commissioned by Cardinal Branda Castiglione, in the church of Castiglione d'Olona, not far from Milan, and another series in the adjoining baptistery.

MASON, FRANCIS, an American missionary, son of a shoemaker in York, England, was born April 2, 1799. He died at Ranyon, March 3, 1874.

MASON, GEORGE HEMMING, painter, A.R.A., was born at Whitley, England, in 1818, the eldest son of a Staffordshire county gentleman. After Mason's return from the Continent, in 1858, when he settled at Wetley Abbey, he continued to paint Italian subjects from studies made during his foreign tour, and then his art began to touch, in a wonderfully tender and poetic way, the peasant life of his native England, and especially of his native Staffordshire, and the homely landscape in the midst of which that life was set. Mason long suffered from heart disease, which carried him off on October 22, 1872.

MASON, WILLIAM, was about the beginning of the last quarter of the eighteenth century one of the most eminent of living poets, but his eminence was owing to the lowness of the poetic level at the time. He is now held in remembrance, not by his poetry, but by his having been the friend, the literary executor, and the biographer of Gray. Born in 1725, the son of a Yorkshire clergyman, entered of St. John's College, Cambridge, in 1742, he took his bachelor's degree in 1745, and seems to have at once decided steadily on a literary career, reading little or nothing, Gray says, but writing abundance. Mason took orders in 1754, and soon afterward was presented to the Vicarage of Ashton, in Yorkshire, the canonry of York, the prebend of Driffield, and the precentorship of York cathedral. Ashton was his residence till his death, in 1797.

MASON AND DIXON'S LINE, a line in the United States between Pennsylvania on the north and Delaware, Maryland, and West Virginia on the south, famous for a long time as the limit between the "free" and the "slave" States. It derives its name from Charles Mason, F.R.S. (1730-87), and Jeremiah Dixon, two English astronomers who, between 1763 and 1767, surveyed the line for 244 miles west from the Delaware river, leaving only thirty-six miles of the Pennsylvania boundary to be fixed in 1782-84. This line must not be confounded, as has often been done, with the parallel of 36° 30' N. latitude, which was assigned by the "Missouri compromise" of 1820 as the limit to the north of which slavery could not be introduced.

MASS. See EUCHARIST and MISSAL.

MASSA, or, to distinguish it from several places of the same name, MASSA CARRARA, a city of Italy, the chief town of the province of Massa, lies on the left bank of the Frigido, a small stream falling into the Gulf of Genoa about three miles lower down. Pop., 18,000.

MASSACHUSETTS, one of the thirteen original States of the Union, and the foremost of the New England division, has a most interesting history. Probably its coasts were known to the early Norsemen, but its first authentic record is that of the discovery of Cape Cod in 1602. John Smith, of Pocahontas fame, explored it to some extent in 1614, but it was not until 1620 that the Puritans of the *Mayflower*, driven northward by stress of weather, effected their landing at Plymouth on December 21st. They had no title then to the land which lay within the New England grant, but this was subsequently acquired, and the colony maintained its existence under the patent from the New England Council, until, in 1692, Plymouth Colony was annexed to Massachusetts. The Massachusetts Colony was established in 1628-30, and made the first settlement of

Boston in the autumn of 1630. A third colony under a grant from Lord Stirling settled in the islands, but united with the main body in 1695. The early years of the colonists were rendered unquiet by continued difficulties with the Indians, who under Pequot, in 1637, and King Philip, 1675-76, caused much trouble and loss of life. The first settlers, being Puritans of the Church of England, denied to others the religious liberty which they had sacrificed so much to obtain for themselves, and persecuted with impartiality Quakers, heretics, Catholics and Protestant Dissenters, not to speak of burning ill-favored old women as witches.

Massachusetts, as formed from the three settlements above referred to, proved as tenacious of her own rights as she was opposed to granting those of others, and was engaged in constant struggle with the English crown. In 1685, the crown finally annulled the charter of the colony, and sent SIR EDMUND ANDROS (*q.v.*) with orders to unite New York and New England under one rule. On the occurrence of the Revolution of 1688, the people rose against Andros, imprisoned him, and reestablished their colonial government. The Province of MAINE (*q.v.*) was united in the new provincial charter of 1691, and Sir William Phips became the first royal governor, the attempt to unite New York with Massachusetts being abandoned. From this time until the accession of George III. to the English throne the history of Massachusetts forms one long record of struggle between the popular party and the home government as represented by the royalist governors. All through this period also the colonies were engaged in wars with the French, either in Maine, Canada or Acadia, and they also had considerable trouble with the Indians.

The Puritan colony led in the active opposition to royal usurpation and the imposition of the Stamp Act, and in 1770 occurred what is known as the "Boston massacre," when the regular troops fired into an unarmed crowd which had gathered for a lawful purpose. Three years later witnessed the Boston "tea-party," when a party of citizens, disguised as Indians, threw the taxed tea into the harbor. The British parliament retaliated by closing the port of Boston, and Gen. Thomas Gage was placed in command of the town. In April, 1775, the first gun of the war was fired at Lexington. The royal forces were shut up in Boston, and the provincial troops, though technically defeated at Bunker Hill, won a great moral victory and demonstrated that the war had been begun by men who were determined to carry it to a successful conclusion. Washington, who had been appointed to the chief command, compelled the British to evacuate Boston in March, 1776, and after this date there was no more fighting within the limits of Massachusetts. The colony supplied in all 67,907 men to the provincial army, of the 231,791 sent by all the colonies (reckoned by annual terms); this being more than the contribution from any other two colonies. From 1776 until 1790 a provisional government had charge, and in the last-named year John Hancock became the first governor of the State.

The Federal constitution was accepted by a small majority, but Massachusetts afterward became a stronghold of the Federalist party. The State opposed the war with England in 1812-14, but furnished a large quota of seamen to the Federal navy. During the following half century Massachusetts developed wonderfully as a manufacturing State and grew rapidly in power and influence. It became the home of the advanced thinkers who opposed slavery. Although the people at large were righteously opposed to the Mexican war, the State sent a regiment of over 1,000 men under Caleb Cushing to aid in carrying it on. The Whig

party, of which Daniel Webster was the chief exponent, supplanted the Federalists, and split to form the Free-soilers, and later the Republican party. To the civil war the Pilgrim State contributed almost 160,000 troops, and over \$50,000,000. The population of Massachusetts was originally of English descent, but since 1840 there has been an enormous immigration of Irish, French Canadians, and Germans.

Massachusetts is bounded on the north by Vermont and New Hampshire; west by Rhode Island and New York; east by the Atlantic Ocean; and south by the Atlantic and the States of Rhode Island and Connecticut. Its greatest length is 160 miles, average breadth 50 miles, and area 7,800 square miles. The coast is irregular and indented, and there is a sea-frontage of 250 miles. The largest river is the Connecticut, which has fifty miles of its course within the State. The Merrimac and Housatonic furnish valuable water-power, which is utilized on a large scale. There are no lakes worth mention, but the State abounds with small streams. The principal islands lie off the southern coast, the chief being Martha's Vineyard and Nantucket. The Berkshire Hills, a continuation of the Green Mountains of Vermont, and the Taconic Range to the west of the Housatonic Valley are the chief elevations, the highest peak of the Taconics being Saddleback (3,500 feet). The climate is somewhat severe, being damp and cold in winter. The extreme range of temperature is from -20° Fahr. to 100°, the mean average being 48° Fahr. The rainfall is about forty-two inches per annum. The climate is healthy, but consumption and pneumonia are the principal causes of death. The soil is hardly to be characterized as fertile, but is cultivated with much care, especially in the vicinity of the towns.

The native flora is that common to New England and New York, but the original forests have disappeared. Minerals are not abundant, but there is some hematite iron ore and plenty of sandstone, syenite and white marble.

The railroad system of Massachusetts is widely extended. The report of the railroad commissioner for the year ending June 30, 1889, gives the following figures: Mileage of main lines and branches 3,090 miles, of which 1,086 are double-tracked. The average cost of standard gauge roads was \$69,573 per mile. Returns were received from fifty-five railroads having an aggregate capital stock of \$151,781,704, and a net debt of \$106,092,582. The total gross earnings were \$55,856,900; and the operating expenses \$37,652,736. The earnings were about equally derived from the freight and passenger departments. Of the fifty-five corporations thirty-three paid dividends ranging from 1 to 10 per cent., and the total dividends declared amounted to \$7,380,366. The whole number of railroad employes was 45,211. Returns were received from forty-six street railway companies, having 620 miles of track, and carrying 148,189,403 passengers. There were fifty and one-half miles of overhead electric railroads in operation, and thirty-eight miles in course of construction.

The State militia has an authorized strength of 5,858, and an active strength of 5,131. The total number of enrolled militia January, 1890, was 325,185. The annual State appropriation for the adjutant-general's office was \$204,300.

The state auditor's report for the year ending December 31, 1889, showed the following figures:

Cash in the treasury Jan. 1, 1889.....	\$ 1,818,036 65
Cash received during the year.....	16,317,917 59

Total.....	\$18,135,954 24
Payments during the year.....	16,548,115 80

Cash in the treasury Jan. 1, 1890....	\$1,587,838 44
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The estimated revenue for 1890 was \$5,049,706, and the estimated expenses \$6,037,383, leaving a deficit of \$987,676 to be provided for by direct State tax.

The resources of the State were given as follows:

Bounty Loan Sinking Fund.....	\$ 7,296,245 31
Coast Defense Loan Sinking Fund.....	5,000 00
Bost., Hart. & Erie R. R. Sink. Fund...	3,529,700 80
Troy & Greenfield R. R. Sink. Fund....	8,248,404 26
Prison and Hospital Loan Sink. Fund...	1,726,043 44
State-House Construct. Loan Sink. Fund	111,077 77
Armory Loan Sinking Fund.....	99,467 82

\$21,015,939 40

Add market value.....	700,000 00
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\$21,715,939 40

Fitchburg Railroad Stock, etc.....	5,840,000 00
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Total resources..... \$27,555,939 40

The liabilities were returned at \$28,259,347.70. The unproductive property of the Commonwealth; public buildings, hospitals, asylums, schools, prisons, etc., was valued at \$11,188,809.

The public debt is classified as follows:

Railroad Loans.....	\$12,584,783 45
War and Bounty Loans.....	8,402,148 90
Public Buildings, etc., including new loans above named.....	7,264,355 50

Total..... \$28,251,287 85

The population of the State as shown by the State census of 1885 was 1,942,141, and according to the United States census of 1890 it had increased to 2,238,943. Boston is the chief city of the State, containing 448,577 inhabitants, and there are five other cities having populations exceeding 50,000, as follows: Worcester, 84,655; Lowell, 77,696; Fall River, 74,398; Cambridge, 70,028, and Lynn, 55,727. Other cities containing from 10,000 to 50,000 inhabitants are Lawrence, Springfield, New Bedford, Somerville, Salem, Holyoke, Chelsea, Taunton, Haverhill, Gloucester, Brockton, Newton, Malden, Fitchburg, Waltham, Newport, Northampton, Quincy and Woburn. All of these cities will be found treated under their respective headings.

The birth rate of the State for the last few years has been about 27 per 1,000 inhabitants per annum, and the death rate 21.

Education receives the greatest attention in Massachusetts, the home of the public school. The last official census showed that of the total 338,726 students and scholars 304,051 attended the public schools. The total number of public school buildings owned by the State was 3,439, valued at \$23,222,781.

Libraries abound in Massachusetts. The Boston Public Library is treated of elsewhere (see LIBRARIES). In 1885 there were within the State 703 secular and 1,668 religious libraries, containing a grand total of 5,876,856 books and pamphlets.

Of institutions for higher education the most important is Harvard College at Cambridge. An extended notice of this college, as also of Williams, Amherst, Tufts, and other colleges will be found under the head of UNIVERSITIES. The state has a very large number of daily and weekly newspapers, and the publishing and printing interests are largely represented.

The constitution of Massachusetts, originally adopted in 1788, was amended in 1820 and 1857. The governor and executive council and the legislature or general court are elected annually. The State has two United States senators and twelve representatives in Congress.

Manufacturing interests include every variety of industry. The decennial census of 1885 showed a total production of goods valued at \$674,634,269; 6,757 estab-

lishments producing a value of \$631,822,681, and the remainder being produced by 16,774 smaller factories. The Bureau of Statistics reported, in 1888, 1,140 representative establishments, an analysis of which will show the principal industries and the number of persons engaged in them:

INDUSTRIES.	Number of Estab- lishments.	Persons Employed.
Agricultural implements	4	631
Arms and ammunition.....	8	1,511
Artisans' tools.....	10	1,131
Boots and shoes.....	233	27,836
Boxes (paper and wooden).....	17	1,023
Buttons and dress trimmings.....	1	250
Carpetings	5	3,183
Carriages and wagons.....	14	996
Chemical preparations (compounded)	3	58
Clocks and watches.....	2	337
Clothing	38	5,426
Cooking, lighting, heating apparatus.	1	46
Cordage and twine	10	2,591
Cotton goods.....	136	65,385
Cotton, woolen, and other textiles ...	2	2,307
Flax, hemp, and jute goods	5	1,132
Food preparations.....	55	3,380
Furniture	41	2,837
Glass	5	510
Hose: rubber, linen, etc.....	1	200
Hosiery and knit goods.....	10	4,539
Leather	74	4,204
Linen.....	3	1,020
Liquors: malt, distilled, fermented..	20	594
Machines and machinery	66	8,796
Metals and metallic goods	98	9,177
Mixed textiles.....	10	1,102
Musical instruments and materials...	19	2,030
Oils and illuminating fluids.....	1	43
Paper and paper goods.....	52	5,509
Printworks, dyeworks, bleacheries ...	16	4,028
Railroad construction	1	46
Rubber and elastic goods.....	18	4,156
Shipbuilding	3	402
Silk and silk goods.....	7	2,419
Stone	13	1,449
Straw and palm leaf goods.....	14	2,561
Tallow, candles, soap, and grease....	11	360
Wooden goods	16	1,114
Woolen goods	82	13,635
Worsted goods.....	15	3,280
All Industries.....	1,140	191,234

The total valuation of assessed real estate on May 1, 1889, was \$1,529,499,912; of personal estate \$542,670,951; making a total valuation of all assessed estate of \$2,072,170,863. On this the entire taxation for State, county, city, and town purposes was \$30,216,650.

The assessment returns for 1889 showed 4,494,207 acres of land subject to assessment. The number of horses thus returned was 172,471; of milch cows, 192,307; of other cattle, 63,884; of sheep, 48,619, and of swine, 37,561.

The chief agricultural products were reported by the United States Commissioner of Agriculture in 1887 as follows:

PRODUCTS.	Quantity produced in 1887.	No. of acres in each crop.	Total valuation.
Indian corn.....bushels	2,124,000	59,997	\$ 1,486,800
Wheat	16,000	1,080	16,000
Rye	245,000	23,550	181,300
Oats.....	703,000	24,752	302,290
Barley.....	75,000	3,313	54,750
Buckwheat.....	77,000	5,387	52,360
Potatoes.....	2,350,000	35,608	2,162,000
Tobacco.....pounds	3,511,000	2,464	596,904
Hay..... tons	770,702	642,252	12,177,092

The fisheries of the State are of great importance, the capital invested being \$8,660,581 and the annual production \$6,462,692. The fishing fleet comprised at the last state census (1885), 866 vessels and 5,549 dories and other boats. The total tonnage was returned as 68,211. Most of the fishing-vessels were built in the State and some in Maine.

MASSÉNA, ANDRÉ, duke de Rivoli, prince of Essling, and marshal of France, the greatest soldier and greatest general of all Napoleon's marshals, and the one man who with education and ambition might have been Napoleon's rival, was the son of a wine merchant, it is said of Jewish origin, and was born at Nice, on May 6, 1758. His parents were very poor, and he began life as a cabin boy. He did not care much for the sea, and in 1775 enlisted in the Regiment Royal Italien, a regiment of Italians in the pay of France. He quickly rose to be under-officer-adjutant; but, finding his birth would prevent his ever getting a commission, he left the army in 1789, retired to his native city, and married. At the sound of war, however, and the word republic, his desire to see service increased, and he once more left Italy, and joined the third battalion of the volunteers of the Var in 1792. By April, 1793, Masséna was chef de battalion, or colonel. In command of the advanced guard he won the battle of Saorgio in August, 1794, capturing ninety guns, and after many successes he at last, on November 23, 1795, with the right wing of the army of Italy, won the great victory of Loano, in which four thousand Austrians and Sardinians were put *hors de combat*. In Bonaparte's great campaign of 1796 and 1797 Masséna was his most trusted general of division; in each battle he won fresh laurels, until the crowning victory of Rivoli, from which he afterward took his title. It was during this campaign that Bonaparte gave him the title of *enfant chéri de la victoire*, which he was to justify till he met the English in 1810. Masséna's next important service was in command of the army in Switzerland, which united the army in Germany under Moreau, and that in Italy under Joubert. There he proved himself a great general; the archduke Charles and Suwaroff had each been successful in Germany and in Italy, and now turned upon Masséna in Switzerland. That general held his ground well against the archduke, and then suddenly, leaving Soult to face the Austrians, he transported his army to Zürich, where, on September 26, 1799, he entirely defeated Suwaroff, taking 200 guns, and 5,000 prisoners. His campaign and battle placed his reputation on a level with that of his compatriot Bonaparte, and he might have made the revolution of Brumaire, but he was sincerely attached to the republic, and had no ambition beyond a desire to live well and have plenty of money to spend. Bonaparte, now first consul, sent him to Genoa to command the *débris* of the army of Italy, and he nobly defended Genoa from February to June to the very last extremity, giving time for Bonaparte to strike his great blow at Marengo. He now went to Paris where he sat in the Corps Législatif, in 1803, and defended Moreau, but where Napoleon took his measure, and did not interfere with him. In 1804 he was made one of the first marshals of France of the new régime, and in 1805 was decorated with the Grand Eagle of the Legion of Honor.

After the peace of Pressburg had been signed, Masséna was ordered to take possession of the kingdom of Naples, and to place Joseph Bonaparte on the throne. This task done, Napoleon summoned Masséna to Poland, where he as usual distinguished himself, and where he for the time gave up his republican principles, and was made duke of Rivoli. In the campaign of 1809 he covered himself with glory at Landshut and at

Eckmühl, and finally at the little village of Essling, which he held with such determination that Napoleon had some right to call his otherwise complete defeat of Aspern a victory. When the retreat to the island of Lobau was ordered, it was Masséna who covered the broken regiments, and held the *tête du pont*; and on the field of Wagram it was Masséna who, though too ill to ride, directed from his carriage the movements of the right wing, and recovered the honor of France. For his great services he was created prince of Essling, and given the castle of Thouars. He was then ordered to Spain to "drive the English into the sea." Masséna himself ascribed his failure to the frequent disobedience of his three subordinate generals, Ney, Reynier, and Junot, and with some justice; but he alone could have stayed so long before the lines, and could have made the long halt at Santarem, which checked Wellington so thoroughly. The retreat was as finely conducted as the advance, and would have been even more triumphant had Ney obeyed orders. Even then he was again ready to try his fortune, and nearly defeated Wellington at Fuentes d'Oñoro, though much hampered by Bessières. Recalled with ignominy, his prestige gone, the old marshal felt he had a right to complain of Ney and of Napoleon himself, and, it is said, opened communications with Fouché and the remnant of the republican party. Whether this be true or not, Napoleon gave his greatest marshal no more employment in the field, but made him merely commandant of the eighth military division, with his headquarters at Marseilles. This command he still held at the restoration of the Bourbons, when Louis XVIII. confirmed him in it. When Napoleon returned from Elba, Masséna, probably by the advice of Fouché, kept Marseilles quiet to await events, the greatest service he could do the royalists, but afterward imputed to him as a fault. After the second restoration Masséna was summoned to sit on the court-martial which tried Marshal Ney, but, though he had been on bad terms with that general, and attributed his own disgrace to him, the old soldier would not be his comrade's judge. This refusal was used by the royalists to cruelly attack the marshal, against whom they raked up every offense they could think of, and whose victories they forgot. This annoyance shortened his life, and on April 4, 1817, the old hero died.

MASSILLON, a city of Stark county, Ohio, is situated on the Tuscarawas, a head stream of the Muskingum, communicates with Lake Erie by the Ohio canal, and forms an important junction for various lines of railway. It is well known for its coal-mines and white sandstone quarries; and it also contains blast-furnaces, rolling-mills, foundries, machine-shops, grist-mills, and extensive establishments for the manufacture of agricultural implements, glass, and paper. Population, 10,092.

MASSILLON, JEAN BAPTISTE, was born at Hyères on June 24, 1663, and died at Clermont on September 28, 1742. He was thus, except Saint-Simon and Fontenelle, the longest-lived of the men of the *Siècle de Louis Quatorze*. It is noteworthy that, like the majority of the great pulpit orators of his own and the preceding generation, he was a southerner.

MASSINGER, PHILIP, one of the most prolific, scholarly, and powerful dramatists among the immediate successors of Shakespeare. He was born in 1584, went to Oxford (St. Alban's Hall) in 1602, and left in 1606. After 1621 many of his plays were acted and published; but from the tone of his dedications it is to be inferred that he was often in straits. The entry in the parish register of St. Savior's—"March 20, 1639-40—buried Philip Massinger, a stranger"—may mean only that Massinger was not a resident in the parish; but it

is sadly out of keeping with the dramatist's place in the respect of posterity.

MASSORAH, better MASSORETH, a late Hebrew word meaning "tradition," is the technical term specially applied to the tradition by which Jewish scholars sought to fix the correct writing and reading of the text of the Old Testament.

MASSOWAH, or MESOWAH, a town of the Abyssinian coast of the Red Sea, on a small coral island of the same name. The height of the island is from twenty to twenty-five feet above the sea, the length does not exceed one-half mile, and the breadth is about one-fourth of a mile. The western half is occupied by the town; in the eastern half are Mohammedan burying-grounds and dismantled cisterns. Population, 6,000.

MASSYS, or MATSYS, QUINTIN, was born in 1466 at Louvain, where he first learned a mechanical art. During the greater part of the fifteenth century the centers in which the painters of the Low Countries most congregated were Bruges, Ghent, and Brussels. Toward the close of the same period Louvain took a prominent part in giving employment to workmen of every craft. It was not till the opening of the sixteenth century that Antwerp usurped the lead which it afterward maintained against Bruges and Ghent, Brussels, Mechlin, and Louvain. Quintin Massys was one of the first men of any note who gave repute to the guild of Antwerp. A legend still current relates how the smith of Louvain was induced by affection for the daughter of an artist to change his trade and acquire proficiency in painting. The date of his retirement from Louvain is 1491, when he became a master in the guild of painters at Antwerp. His most celebrated picture is that which he executed in 1508 for the joiners' company in the cathedral of his adopted city. Next in importance to that is the *Maries of Scripture round the Virgin and Child*, which was ordered for a chapel in the cathedral of Louvain. Both altar-pieces are now in public museums, one at Antwerp, the other at Brussels. He died in 1530.

MASTER AND SERVANT. These are scarcely to be considered as technical terms in law. The relationship which they imply is created when one man hires the labor of another for a term. Thus it is not constituted by merely contracting with another for the performance of a definite work, or by sending an article to an artificer to be repaired, or engaging a builder to construct a house. Nor would the employment of a man for one definite act of personal service—*e.g.*, the engagement of a messenger for a single occasion—generally make the one master and the other servant.

MASTIC, or MASTICH, a resinous exudation obtained from the lentisk, *Pistacia Lentiscus*, an evergreen shrub of the natural order *Anacardiaceæ*. The lentisk or mastic plant is indigenous to the Mediterranean coast region from Syria to Spain, but grows also in Portugal, Morocco, and the Canaries.

MASTODON, a name, suggested by the conical or papillary form of the projections on the molar teeth of some of the species, given by Cuvier to a genus of extinct elephant-like animals. Their position in the sub-order *Proboscidea* of the great order *Ungulata* has been indicated in the article MAMMALIA. In size, general form, and principal osteological characteristics the Mastodons resembled the Elephants. It is by the teeth alone that the two groups are to be distinguished. The range of the genus *Mastodon* in time was from the middle of the Miocene period to the end of the Pliocene in the Old World, when they became extinct; but in America several species—especially the best-known, owing to the abundance of its remains, which have been variously

called *M. ohioticus*, *M. americanus*, and *M. giganteus*—survived to quite a late Pleistocene period.

MAS'ÚDY. Abú'l-Hasan 'Alí ibn Hosein ibn 'Alí el-Mas'údy, was born at Bagdad toward the close of the ninth Christian century. Great part of his life was spent in travel; in 912-13 A.D., he was at Múltán in the Punjab, and also visited Mansúra. Three years later he was at Basra and met Abu Zeid, the geographer whose remarks on the extreme East are comprised in Reinaud's *Relation des Voyages*. His writings and those of Mas'údy are indebted each to the other. In the same year he composed the *Meadows of Gold*. The last ten years of his life were passed in Syria and Egypt. His last work, *The Indicator and Monitor*, was written 345 A.H., and his death took place in Egypt the same year, (956-57 A.D.)

MASULIPATAM, the chief town of Kistna district, Madras, India, and a seaport, with a population of 36,316.

MATAMOROS, a city of Mexico, in the province of Tamaulipas, on the southern bank of the Rio Grande, about thirty-five miles from its mouth, and directly opposite Brownsville in Texas. Built in an open plain, Matamoros has its streets laid out with great regularity; and the general appearance gives evidence at once of its recent rise into importance and of the influence of the architectural fashions of the United States. The principal building is the large but heavy-looking cathedral. An extensive traffic, both legitimate and contraband, is carried on between Matamoros and Brownsville, and in spite of the bar at the mouth of the river, which in foul weather prevents the entrance even of small schooners, the place is not without its value to Mexico as a foreign port. The imports of American and of European goods are valued each at about \$1,100,000, with a growing preponderance on the side of the American. Cotton, flax, silk, and woolen goods are the main items in the European list; cottons, leaf tobacco, wheat-flour, machinery, and preserved meats in the American. Hides and skins, live animals, and wool are the principal exports apart from coin and bullion, which are largely smuggled to avoid the export duty. The population is about 20,000.

MATANZAS, or SAN CARLOS DE MATANZAS, a city and seaport on the north coast of Cuba, and the chief town of a province, lies fifty-two miles east of Havana, with which it is connected by rail. It is a well-built place of from 36,000 to 40,000 inhabitants, occupying a fine site at the head of the Bay of Matanzas, and separated from its suburbs Pueblo Nuevo and Versailles by the San Juan on the one hand and the Yumurri on the other.

MATARÓ, a Mediterranean seaport of Spain, in the province of Barcelona, twenty-one miles to the north-east of that city, is beautifully situated on the lower slopes and at the foot of the range of hills which skirt the coast and shelter the town from the cold, northern winds. The streets of the new town, lying next the sea, are wide and regularly built; those of the old town, farther up the hill, still preserve much of their ancient character. The population in 1877 was 17,405.

MATCHES. Till the close of the eighteenth century flint and steel with tinder-box and sulphur-tipped splints of wood—"spunks" or matches—were the common means of obtaining fire for domestic and other purposes. The sparks struck off by the percussion of flint and steel were made to fall among the tinder, which consisted of carbonized fragments of cotton and linen; the entire mass of the tinder was set into a glow, developing sufficient heat to ignite the sulphur with which the matches were tipped, and thereby the splints themselves were set on fire. Instead of tinder, match-paper or

touch-paper, a thick, bibulous paper impregnated with saltpeter (nitrate of potash), and amadou or German tinder, a thick, leathery and porous preparation from the fungus *Polyporus fomentarius*, were often used.

It was not till 1805 that any attempt was made to use chemical agency for the ordinary production of fire. In that year M. Chancel, assistant to Professor Thenard of Paris, introduced an apparatus consisting of a small bottle containing asbestos, saturated with strong sulphuric acid, with splints or matches coated with sulphur and tipped with a mixture of chlorate of potash and sugar. The matches so prepared, when brought into contact with the sulphuric acid in the bottle, ignited, and thus, by chemical action, fire was produced. It appears also that in the same year phosphorus matches were known in Paris, and in 1809 Derepas proposed to lessen the dangerously great inflammability of the phosphorus match by making an igniting mixture of that element with magnesia. It is also said that M. Derosne made a friction match with a phosphorus tip in 1816.

The first really practical friction matches were made in England in 1827, by Mr. John Walker, a druggist of Stockton-on-Tees. These were known as "Congreves," after Sir William Congreve, Bart., the inventor of the Congreve rocket, and consisted of wooden splints or sticks of cardboard coated with sulphur and tipped with a mixture of sulphide of antimony, chlorate of potash and gum. The phosphorus friction match of the present day was first introduced on a commercial scale in 1833; and it appears to have been made almost simultaneously in several distinct centers. Improvements in the manufacture have been numerous; and the industry is now carried on with a complete system of ingenious labor-saving machinery. The use of phosphorus as a principal ingredient in the igniting mixture of matches has not been free from very serious disadvantages. It is a deadly poison, the free dissemination of which has led to many accidental deaths, and also to numerous cases of willful poisoning and suicides. Workers also who are exposed to phosphoric vapors are subject to a peculiarly distressing disease which attacks the jaw, and ultimately produces necrosis of the jawbone; it appears, however, that, with scrupulous attention to ventilation and cleanliness, almost all risk of the disease may be avoided. Strenuous efforts have been made by numerous inventors to introduce matches having no phosphorus in their igniting mixture, but hitherto with indifferent success. The most serious objections to the use of phosphorus have, however, been overcome by the discovery of the modified condition of that body known as red or amorphous phosphorus, made by Professor Anton Von Schrötter of Vienna in 1845, and the utilization of that substance in the now well-known "safety matches" invented by Lundström of Sweden in 1855.

MATÉ, or PARAGUAY TEA, consists of the dried leaves of *Ilex paraguayensis*, St. Hil., an evergreen shrub or small tree belonging to the same natural order as the common holly, a plant to which it bears some resemblance in size and habit. The leaves are from six to eight inches long, shortly-stalked, oblong wedge-shaped, rounded at the upper end, and finely toothed at the margin. The small white flowers grow in forked clusters in the axils of the leaves; the sepals, petals, and stamens are four in number; and the berry is four-seeded. The plant grows abundantly in Paraguay, Corrientes, Chaco, and the south of Brazil, forming woods called *yerbales*.

MATERA, a city of Italy in the northeast of the province of Potenza, forty-eight miles from Potenza, on the high road to Bari. Population, 18,000.

MATERIALISM is that system of philosophy which ascribes to matter the final cause of *all* phenomena,

and gauges all phenomena by the rules which govern matter. In the earliest stages of its existence philosophy was more or less materialistic, more by reason of paucity of research than of any direct bias in that direction, as a result of investigation. So, too, religions of various races and peoples are materialistic in their incipency, for the reason that the obtrusive forms of nature will present themselves for analogical apothecosis, and consequently the laws which govern the objects of deification must appear in the worship of those objects when they are deified. The various religions and philosophies have always tended either to soar away into realms of absolute idealism or else to fall prone in gross materialism. The system of philosophy predicating its premises on consciousness has always, if carried to its last analysis, denied the existence of matter, while a system beginning with sensation has under similar circumstances always wound up its deductions by the destruction of mind and spirit and the erection in its stead of matter and material laws as supreme.

Materialism, as before said, has permeated all philosophies and religions in their beginnings, but the first systematic materialistic doctrines were propounded by the Greek atomists. These philosophers were grossly materialistic in their views, and ascribed even the creation of the universe to the working of material laws. All matter was by them reduced to infinitesimal atoms, these atoms being indivisible and indestructible. They moved one upon another, the heavier gravitating downward and the lighter rising, until finally, by mere force of these continual evolutions of the atoms, the worlds were created. Epicurus held this doctrine—only he went a little further and claimed that everything which exists sprang from natural causes; that nothing could spring from a non-existence, and that nothing can be annihilated. The philosophy of Epicurus had its followers even as late as the seventeenth century, the most notable among them being Pierre Gassendi. Gassendi was far more extreme in his views, however, than even Epicurus, for he ascribed force and even sensation to atoms. By some modern writers Gassendi is considered the founder of the modern doctrine. Another investigator some years later was La Mettrie, who, having observed the effect of blood-pressure on the brain, so far as thought or mental phenomena is concerned, arrived at the conclusion that all mental phenomena are attributable to physical causes—a position which, while it cannot be proven, yet cannot be successfully combated. His line of thought was taken up by other writers, notably by Von Holbach, who carried the reasoning to the extreme of absolutely denying a spiritual First Cause or Creator, and rendering all nature dependent entirely on physical causes for its creation.

Lord Bacon, by his method of inductive reasoning, probably did more to advance the cause of materialism than any other one man. His system was followed and elaborated by Hobbes, who went to the extreme analysis of what Bacon had started. Hobbes claimed that the mind itself was material, and that consciousness was the result of the properly performed functions of our various organs. Sensation he ascribed to the impact of external matter upon the internal matter of mind—like as the beat of the wave on the seashore; the environment of the individual constituting, as it were, the sea, and the mind being in a like sense the beach on which the waves beat and produce impressions; or, to use a more apt illustration, the mind is the diaphragm of a telephone which communicates sensations to the individual by reason of impact of surrounding matter on this diaphragm. The mind, like other matter, is elastic, and receives impressions from contact with other

matter, these impressions leaving traces of themselves on the mind; just as the cylinder of the photograph receives impressions from the sound waves beating against the disk, but unlike the cylinder in the fact that these impressions gradually wear away. This gradual wearing away of the impressions is *imagination*. If it is retrospective it is *memory*; memory and imagination are the same, only differing in tense—the one having reference to impressions that have been received and the other to those yet to be received. Remarkable attempts at compromise between materialism and the doctrines of revealed religion are exhibited by Priestly and Hartley.

Other noted names among modern materialists are Vogt, Moleschott and Buchner, Hæckel, Darwin, Huxley, Tyndall and Spencer, the latter four names being those of Englishmen. These English writers have approached the question from a purely physical standpoint, ignoring the religious side of the question altogether. Darwin, the apostle of evolution, put forth the theory that all higher beings are descended from other forms which degress in the scale of organic life until they arrive at forms which are not distinguishable from the inorganic. This gradual evolution has occupied almost infinite time, and has always gone on in accordance with a law of “natural selection;” and by reason of the “survival of the fittest” the present forms have been reached. This evolution is so slow as not to be perceptible in any appreciable time; yet, according to the theories laid down, it must go on *ad infinitum*. No system of philosophy ever awakened at once so much comment and so much opposition. The doctrine of Darwin’s evolution has been mercilessly ridiculed and caricatured, while Tyndall’s challenge to the orthodox to apply a material test to the efficacy of prayer raised a howl of indignation that was heard all around the world. Spencer and Huxley, too, have not been more fortunate in escaping criticism. The difference between the postulations of ancient and modern materialism lies in the fact that the former reasoned from a metaphysical beginning to a material conclusion, while the latter approaches the question from the standpoint of physical facts, which have been (or are alleged to have been) proven by scientific investigation.

The great weaknesses of materialism pointed out by its adversaries are that no physical phenomena can be explained by the mere external elements presented. Apart from these there is always an apprehension of force or power. This power is never accounted for, and must be something outside of the physical or material. Even the Epicurean theory that the heavier atoms sank and caused the lighter ones to be displaced leaves the attribute of weight unexplained, for, as Morell suggests, it does not cover the point to say a heavier body sinks in a lighter element in obedience to a law of gravity, for behind the *law* must be a force which, constantly acting in a uniform manner, gives rise to such a law. This force the materialist does not explain. Besides this, materialism must begin with the eternity of matter. This is contrary to all our knowledge of matter and the inferences which our experience justifies us in drawing. That matter can spring into being spontaneously seems incapable of admission, for no matter how small the ultimate subdivision from which it starts there is left unexplained the mystery of its existence. The Creator of matter and the Giver of the laws in obedience to which it grouped itself into its present shapes are still to be accounted for, and as long as these facts remain materialism must be a hypothesis. As far as regards our mental experience it is claimed that, while to a great extent mental phenomena are dependent on physical conditions such as a healthy state of the brain, etc.,

yet our mental possessions are not wholly the result of such physical attributes. The mind is claimed to be a spiritual entity, invisible, and certain mental operations and experiences are inexplicable on the hypothesis of materialism. The last and crowning argument against materialism offered by its opponents is the "unity of design" in creation, which they claim indisputably shows the presence of the guiding mind and powerful hand of an omnipotent being—the Creator—that such a coördination cannot be the result of accident.

MATHEMATICAL DRAWING AND MODELING. The necessity for geometrical drawings and models is as old as geometry itself. The figure has formed the basis of many a geometrical truth; and demonstration by mere inspection of this has frequently to do service for more rigorous proof. So necessary is this visual representation of an idea that there is hardly a branch of mathematics which does not make use of it in the form of tables, symbols, formulæ, etc. The visual method is especially important in geometry. The figure is to the geometer what the numerical example is to the algebraist—on the one hand limiting the horizon, on the other imparting life to the conception. Herein lies the didactic value of the figure, which is the more indispensable the more elementary the stage of instruction. To be able to dispense with it is a faculty acquired only after a long and special training. The power of mental picturing is a talent which can be so strengthened by use that even a slightly gifted mind may acquire the power of carrying out a series of geometrical operations without the aid of a figure, provided these do not lead into unfamiliar regions. But each new group of ideas which the geometer would master requires a new graphic setting forth, which not even the experienced can dispense with. Drawings are sufficient in plane geometry; but solid geometry requires models, except in specially simple cases, in which delineation by means of perspective or some conventional method may suffice. Then, again, in passing from the geometry of the plane, straight line, and point in space to that of curved surfaces, tortuous curves, etc., new and distinct graphical methods are necessary. The difficulties encountered in understanding new groups of geometrical forms are best removed by a careful study of a small number of characteristic models and drawings. As a means of education, the model is lively and suggestive, forming in this way a completing factor in the course of instruction.

MATHEMATICS. Any conception which is definitely and completely determined by means of a finite number of specifications, say by assigning a finite number of elements, is a mathematical conception. Mathematics has for its function to develop the consequences involved in the definition of a group of mathematical conceptions. Interdependence and mutual logical consistency among the members of the group are postulated, otherwise the group would either have to be treated as several distinct groups, or would lie beyond the sphere of mathematics.

As an example of mathematical conception we may take "a triangle;" regarded without reference to its position in space, this is determined when three elements are specified, say its three sides; or we may take a "color sensation," which, on Young's theory, is determined when the amounts of the three fundamental color sensations that enter into it are stated. As an example of a non-mathematical conception we may take "a man," "a mineral," "iron," no one of which admits of being so determined by a finite number of specifications that all its properties can be truly said to be deducible from the definition.

A mathematical conception is, from its very nature, abstract; indeed its abstractness is usually of a higher order than the abstractness of the logician. Thus, for instance, we may neglect the other attributes of a body and consider merely its form; we thus reach the abstract idea of "form." But the form of an irregular fragment of stone does not admit of being finitely specified, and is therefore not susceptible of mathematical treatment. If, however, we have a carefully squared cubical block of granite to deal with, for most practical purposes its form is specified by stating that it is a cube, and assigning one element, viz., an edge of the abstract mathematical cube by which we replace it. This example illustrates at once the limits of mathematical reasoning and the nature of the bearing of mathematics on practice.

A variety of words have been used to denote the dependence of a mathematical conception upon its elements. It is frequently said, for instance, that the conception is a "function" of its elements. One word has recently come into use which is very convenient, inasmuch as it draws attention at once to the fundamental idea involved in mathematical conception and to the prime object of mathematical contemplation, viz., "manifoldness."

Number is involved in the notion of a manifoldness both directly, as anyone can see, and also indirectly in a manner which the mind untrained to mathematical thinking does not so readily understand. Take on the one hand the case of a triangle considered without reference to its position but merely as composed of three limited straight lines, it may be completely determined in various ways by assigning three elements. A triangle may therefore be called a triple discrete manifoldness. A plane quadrilateral considered in the same way (being fully determined when four sides and a diagonal are known) is a quintuple discrete manifoldness; and a plane polygon of n sides as $(2n - 3)$ -ple discrete manifoldness. Consider on the other hand the assemblage of points on a given straight line, they are infinite in number yet so related that any one of them is singled out by assigning its distance from an arbitrarily chosen fixed point on the line. Such an assemblage is called a one-fold continuous manifoldness, or simply a onefold manifoldness; another example of the same kind is the totality of instants in a period of time. The assemblage of points on a surface is a twofold manifoldness; the assemblage of points in tridimensional space is a threefold manifoldness; the values of a continuous function of n arguments an n -fold manifoldness.

It should be observed that the distinction between discrete and continuous manifoldness is not of necessity inherent in the conception. For one purpose we may treat a conception as a discrete manifoldness, for another as a continuous manifoldness. Thus we have seen that an unlimited straight line may be treated as a onefold continuous manifoldness; but, if we regard it as a whole, and with reference to the fact that its position in space is determined by four data, it becomes a quadruple discrete manifoldness.

The primary, although not the only, operation in the treatment of a discrete manifoldness is numbering or counting; hence arises the pure mathematical science of number, comprehending (abstract) *Arithmetic* and its higher branch commonly called the *Theory of Numbers*. Without entering into a discussion of the definitions and axioms of the science of number, it will be sufficient here to remark that all numerical operations are reducible to three fundamental laws commonly called the commutative, associative, and distributive laws. The four fundamental processes, or four species, as they are sometimes called, two of which, addition and multiplication,

are direct, and two, subtraction and division, inverse, are solely defined by and derive their meaning from the three laws of operation just mentioned.

A careful consideration of the methods in vogue for dealing with continuous manifoldness shows that they reduce themselves to two, which may be called the synoptic method and the analytic method. In the synoptic method we deduce the properties of a manifoldness by contemplating it as a whole, aiding our understanding, when it is necessary to do so, by a diagram, a model, or any other concrete device more or less refined according to circumstances. In the analytic method we fix our attention upon the individual elements of the manifoldness, usually defining each element by a definite number of specifications the variation of which leads us from element to element of the given manifoldness. We examine the properties of an element in the most general manner, and from them we predicate the properties of the manifoldness as a whole.

The best and most familiar examples of the synoptic treatment of manifoldness are the different varieties of pure geometry. Among these we may mention the apagogic geometry of the Greeks, which starts with a collection of definitions and axioms, enunciates and proves proposition after proposition with great attention to strict logical form and with continual reference to the grounds of inference, but pays little attention to the ordering of theorems with a view to mutual illustration, and carefully suppresses all traces of the method by which the propositions were or might have been discovered. It is true that the Greeks were in possession of a method, called by them analysis, which had for its object the discovery of geometrical truth. But this consisted merely in taking any proposition suspected to be true and tracing its consequences until one was reached which each either contradicted a known proposition or else was true and capable of leading by a direct process of reasoning (synthesis) to the proposition in question. In this we have no trace of the systematic development of geometric truth, and the method was apparently regarded by the ancients themselves as imperfect, for it makes no figure in such of their systematic treatises as have reached us. In somewhat sharp contrast with the Grecian geometry, but still essentially synoptic in method, stand the different varieties of modern geometry, which aims at greater generality in its definitions, pays less explicit attention to logical form, but arranges geometrical propositions as much as possible in the natural order of development or discovery, and above all makes extensive use of the principle of continuity. As examples of the modern geometry may be cited the descriptive geometry (*Géométrie Descriptive, Darstellende Geometrie*) of Monge; the projective geometry (*Géométrie Projective, Geometrie der Lage*) of Poncelet, Steiner, and Von Staudt; and the geometry of transformation in general, of which projective geometry is but a particular case. There is one other highly interesting form of modern geometry, which, although analytic in some of its developments, and often exhibited in close alliance with other analytical methods, is nevertheless synoptic as to its fundamental principle, viz., arithmetic geometry (*Abzählende Geometrie*) or theory of characteristics, which originated in the characteristic equations of Pliücker, and was developed into a powerful special method by Chasles and others. (See GEOMETRY and CURVE.)

Geometry, however, is not the only field for the synoptic treatment of manifoldness. This is obvious if we reflect that any magnitude whatever may be represented by a line; so that any function of not more than two elements may be represented by a geometrical construction and treated by any method applicable in ge-

ometry. Since the famous dissertation of Riemann, *On the Hypotheses that form the Basis of Geometry*, mathematicians have been familiar with the fact that the methods of geometry suitably generalized can be applied to the treatment of an n -fold manifoldness; and in point of fact the synoptic treatment of manifoldness under the name of n -dimensional geometry has been usefully employed by Cayley and others as an adjunct to the analytic method.

The fundamental characteristic of the analytical treatment of an n -fold manifoldness is the specification of an element by means of n continuously varying quantities or variables (see MEASUREMENT). For dealing with continuous as distinguished from discrete quantity we have the special analytical method of the INFINITESIMAL CALCULUS (*q.v.*), built upon the notion of a limit, with its various branches, viz., the differential calculus, the integral calculus, including differential equations, the calculus of functions, and the theory of functions in general (see FUNCTION). But, whether we make use of the algorithm of the infinitesimal calculus or not, we find upon examination that all analytical operations with continuous quantity fall under the three laws of commutation, association, and distribution, so that they are fundamentally identical with the operations with discrete quantity; the difference so far as there is any consists simply in the greater generality of the operand. The same fact may be looked at instructively in another light. Whether we consider analytical processes in concrete applications or look at them abstractly, we are equally led to the notion of a unit, by the multiplication or subdivision of which all the other quantities that enter into our calculus are derived. The exigencies of continuity are met by allowing that the multiplication or subdivision of the unit can be carried on to an unlimited extent; but in any case where analytical formulæ have to be reduced to arithmetical calculation (in which of course only a finite number of figures or arithmetical symbols can be used) the subdivision (or multiplication) of the unit actually stops short at a certain point; in other words, all our methods are, in practice at least, discrete. Here therefore we have the meeting point of discrete and continuous quantity, and on this ground alone we might infer the fundamental identity of their laws of operation.

The abstract science of quantity which we have just seen to be the essential part of the analytic treatment of manifoldness receives the name of ALGEBRA (*q.v.*) In addition to those already mentioned, we may enumerate the following as among the more important departments of applied mathematics: Kinematics; Abstract Dynamics, including Statics and Kinetics whether of a Particle, of a Rigid Solid, of an Elastic Solid, of a Fluid, or of a Chain; Statistical Mathematics, as exemplified in the Theory of Annuities, and the Kinetic Theory of Gases; the Mathematical Theory of Diffusion whether of Heat or of Matter; the Theory of Potential; and so on. (See MECHANICS, HYDROMECHANICS, ANNUITIES, HEAT, ELECTRICITY, MAGNETISM, etc.)

MATHER, COTTON, born in 1663, was the most learned and widely known of a family which enjoyed singular consideration, and exercised commanding influence upon New England in its first century. Richard, son of Thomas Mather of Lowton (Winwick), Lancashire, England, after studying for a time at Brasenose, Oxford, and teaching and subsequently preaching at Toxteth Park, went to New England, for nonconformity's sake, in the summer of 1635, where, till his death in 1669, at seventy-three, he was pastor of the Congregational church in Dorchester (now a part of Boston). His youngest son Increase took his first degree at Harvard College in 1656, at seventeen

—returning, after a visit to the old country, in which he served several pulpits, to take at twenty-five the pastorate of the second (or North) church in Boston, which place he held till his death in 1723 at eighty-five, while, in addition, he had been acting, or actual, president of the college most of the time from 1681 to 1701, the author of 160 books or tracts, and for four of its most perilous years the choice of all its citizens to represent the Massachusetts colony before the English Government. His wife Maria was daughter of the famous John Cotton, and their first-born received both family names, and took his B. A. degree at less than sixteen, at Harvard, in 1678. As a pastor he was exceptionally laborious. As a philanthropist, while abundant in personal benefactions, he originated more than twenty societies for public charity, bore the cost of a school for Christianizing the negroes, and, at the risk of life, in the face of popular opposition medically led, advocated and vindicated the introduction of inoculation as a protection against the then terrible ravages of the smallpox. As an author he was learned—publishing in French, Spanish, and Algonquian as well as English—and voluminous, 382 of his printed works having been catalogued, several of which are elaborate books, and one a folio of 800 pages; while his *Biblia Americana*, by him considered the great work of his life, remains in six huge volumes of manuscript to this day. He was superstitious, and it was his misfortune that, as to witchcraft, he was not, as with vaccination, in advance of his generation, any more than such men as Richard Baxter and Sir Matthew Hale. Of his works, the *Magnalia* and *Ratio Disciplina* are indispensable to the student of New England history. He died in 1728.

MATHEW, THEOBALD, popularly known as Father Mathew, the "Apostle of Temperance," was descended from an illegitimate branch of the Llandaff family, and was born at Thomastown, Tipperary, on October 10, 1790. He received his school education at Kilkenny, whence he passed for a short time to Maynooth; from 1808 to 1814 he studied at Dublin, where in the latter year he was ordained to the priesthood. Having entered the Capuchin order, he, after a brief time of service at Kilkenny, joined the mission in Cork, which was the scene of his religious and benevolent labors for many years. The movement with which his name is most intimately associated began in 1838 with the establishment of a total abstinence association, which in less than nine months, thanks to his moral influence and eloquence, enrolled no fewer than 150,000 names. It rapidly spread to Limerick and elsewhere, and some idea of its popularity may be formed from the fact that at Nenagh 20,000 persons are said to have taken the pledge in one day, 100,000 at Galway in two days, and 70,000 in Dublin in five days. In 1849 he paid a visit to the United States, returning in 1851. He died at Queenstown on December 8, 1856.

MATHEWS, CHARLES, comedian, was born in London, June 28, 1776, and died at Plymouth June 28, 1835.

MATHEWS, CHARLES JAMES comedian, son of the above, was born at Liverpool, December 26, 1803, and died July 26, 1878.

MATILDA, countess of Tuscany, popularly known as the Great Countess, was born in 1046, of a race of nobles of Lombard descent. Matilda was twice married, first to Godfrey of Lorraine, surnamed the Hump-backed, son of her mother's second husband, and secondly to Guelph of Bavaria—both marriages of policy, which counted for little in her life. She died of gout in 1114, in her sixty-ninth year, and was buried first at San Benedetto, and finally in the Vatican.

MATLOCK, a town of Derbyshire, England, is situ-

ated on the river Derwent and on the Midland Railway, 149 miles northwest of London and seventeen northwest of Derby. Population, about 6,000.

MATSYS, QUINTIN. See MASSYS.

MATTEAWAN, a New York town, in the county of Dutchess, lies on Fishkill Creek, about sixty miles from New York city. It has extensive water-power and numerous manufactures, together with banks, newspapers, churches, schools, telegraphs, and railroads. It carries on considerable trade, and has a population (1890) of 5,000.

MATTER, PROPERTIES OF. If we knew thoroughly the nature of any piece of matter, the deduction of its properties would be a question of mere reasoning, just as (for instance) the definition of a circle really involves all the properties which mathematical methods have deduced from it. But, as we do not even know what matter is, in the abstract, the converse operation is (at least for the present) the natural and necessary one. We must endeavor from the experimentally ascertained properties of matter to discover what it is. The reader will find the limits of our present knowledge in the article ATOM. The properties of matter may be arranged in several classes, thus:

1. Properties of matter in itself; such as Inertia, Hardness, Brittleness, ELASTICITY (*q.v.*), Density, Compressibility, Viscosity, etc. These depend upon its ultimate structure and upon the law and intensity of the so-called molecular forces. (See ATOM, CONSTITUTION OF BODIES, ATTRACTION.)

2. Relative properties of different kinds of matter, chemical, catalytic, etc. (See CAPILLARY ACTION, CHEMISTRY, DIFFUSION, etc.)

3. Properties relative to different forms of energy: Conductivity (Thermal and Electric), Specific Gravity, Specific and Latent Heat, Transparency, Color, Specific Inductive Capacity, Radiating and Absorbing Power, Magnetic Retentiveness, etc., Thermo-electric Position, Refractive Index, Reflective Power, Double Refraction, Rotatory Polarization, etc.

MATTEUCCI, CARLO, an Italian physicist, was born at Forlì, June 20, 1811, and died at Leghorn, June 25, 1868.

MATTHEW, a shortened form of Mattaniah or Mattithiat, equivalent to Theodorus; one of the twelve apostles of Jesus Christ, and, according to tradition, the author of the First Gospel. In its full Hebrew form the name occurs several times in the Old Testament, being borne by more than one person of priestly or Levitical family. Matthew, in the Gospel which bears his name, is described as having been a tax-gatherer, and the circumstances of his call to become a follower of Jesus, which he received as he sat at the "receipt of custom" or "tax office" in one of the towns by the Sea of Galilee, are briefly related in chap. ix. 9. It has sometimes been doubted, but without any good reason, whether the precisely parallel narrative relating to "Levi the son of Alphæus" has reference to the same person (compare the double names Simon and Peter, Joses and Barnabas, and others). In the lists of the names of the apostles given in the synoptical Gospels and in the Acts, Matthew ranks third or fourth in the second group of four. Little is recorded of him except the feast which he gave in his house at the beginning of his discipleship; the way in which this is related seems to indicate that he was (comparatively at least) a wealthy man. He was also present in the "upper room" at Jerusalem after the ascension, when Matthias was elected to be the successor of Judas. Tradition has nothing trustworthy to tell about his subsequent career, but there is nothing inherently improbable in the allegation of Eusebius that he spent several years in Jerusalem preaching to the Hebrews (and writ-

ing the Gospel which bears his name), or that he afterward extended his missionary activities in other directions.

MATTHEW, GOSPEL OF. See GOSPELS.

MATTHEW OF PARIS, one of the most important writers in connection with English mediæval history, was born about the year 1200, or possibly somewhat earlier.

We have it on his own authority, as recorded in an autograph marginal note, that he assumed the monastic habit at the abbey of St. Alban's on January 21, 1217. In 1236 he accompanied the newly-elected prior of his abbey, John of Hertford, to London, to attend the ceremony of the nuptials of Henry III. and Eleanor of Provence; and in October, 1247, he was at Westminster, in order to be present at the celebration of the feast of St. Edward the Confessor, when he was desired by the king himself to write an account of the proceedings. The most important event in his tranquil and uneventful life (which was passed chiefly within the walls of his monastery) occurred in the year 1248, when he was sent on a mission to the Benedictine monastery of Holm (Thronthjem), which had become involved in difficulties owing to the maladministration of one of its abbots. The last incident recorded by the historian himself with respect to his own career is the fact that he exerted his influence with Henry on behalf of the university of Oxford, when that body found its privileges endangered by the encroachments of the bishop of Lincoln. In his latter years, Matthew's growing infirmities compelled him to have recourse to the aid of a fellow-monk in order to complete his works; this assistance is to be traced in the *Historia Anglorum* from 1251 to the end of the work (1253); in the *Abbre-viatio Chronicorum* for the years 1253, 1254, and 1255; and in the *Chronica Majora* for the years 1258 and 1259. Matthew died after the month of May, 1259.

MATTHIAS, Holy Roman emperor, the fourth son of the emperor Maximilian II., was born on February 24, 1557. In 1595 Matthias was made regent in Austria, and in 1606 the archdukes recognized him as head of the house of Hapsburg. In 1612, after the death of Rudolph, Matthias was elected emperor; and his reign was not less disturbed than that of his predecessor. The intervention of Turkey in Transylvania led to war, and in 1615 Matthias, being unsupported by the empire and by his own estates, found that he had no alternative but to conclude peace for twenty years on humiliating terms. He died March 20, 1619.

MATTHIAS CORVINUS, king of Hungary, was born at Klausenburg, in Transylvania, on March 27, 1443, and died at Vienna on April 6, 1490. He was the younger son of John Hunyady (Corvinus), who died in 1456, after having been "governor of Hungary" from 1446 to 1453. On the death of John, the elder of his two sons (Ladislaus) was executed by command of Ladislaus Posthumus, while Matthias was imprisoned at Prague; but shortly after the king's own death without issue in 1457, Matthias Hunyady (Corvinus) was elected by the Hungarian magnates to the vacant throne (January 24, 1458). The leading events of his reign are summarized in the article HUNGARY.

MATTING. Under this name are embraced many coarse woven or plaited fibrous materials used for covering floors or furniture, for hanging as screens, for wrapping up heavy merchandise, and for other miscellaneous purposes.

MATTOON, a post-town of Illinois, is an important railroad center. It lies in Coles county, and has considerable manufactures. It has banking, school, and church accommodations, and several newspapers are published here. It has telegraph facilities, and the car-

shops of the Illinois Central railroad are located here. Population, 6,879 (1890 census).

MATURIN, CHARLES ROBERT, born in 1782, died in 1824, Irish novelist and dramatist, perplexed the serious and served as a butt for the light-minded critics of the first quarter of the nineteenth century.

MAUBEUGE, a fortified place of northern France, situated on both banks of the Sambre, 142 miles by rail northeast from Paris, and about two miles from the Belgian frontier. Its fortifications were planned by Vauban; the enceinte is pierced by two gateways, that of France and that of Mons. Population (1890), 15,000.

MAULMAIN, or MOULMEIN, a town in Amherst district, British Burmah, situated on the left bank of the Salwin river. Population (1890), 60,000.

MAUNDY THURSDAY, the day preceding Good Friday. The word "maundy" (Middle-English *maundee* or *maunde*, a command) is identical with the "mandatum" of the rubric and anthem of the Missal for the fifth day in Holy Week, sometimes called "Dies Mandati."

MAUPERTUIS, PETER LOUIS MOREAU DE, a mathematician and astronomer of considerable reputation in his day, was born at St. Malo, July 17, 1698. When twenty years of age he entered the army, becoming lieutenant in a regiment of cavalry, and employing his leisure on mathematical studies. After five years he quitted the army and was admitted, in 1723, a member of the Academy of Sciences. In 1728 he visited London, and was elected a fellow of the Royal Society. In 1736 he acted as chief of the expedition sent by Louis XV into Lapland to measure the length of a degree of the meridian within the polar circle, in order to settle the then much disputed question of the oblate figure of the earth, and, on his return home, he became a member of almost all the scientific societies of Europe. In 1740 Maupertuis went to Berlin on the invitation of the king of Prussia, and took part in the battle of Mollwitz, where he was taken prisoner by the Austrians. On his release he returned to Berlin, and thence to Paris, where he was elected director of the Academy of Sciences in 1742, and in the following year was admitted into the Academy. In 1746 he was chosen president of the Royal Academy of Sciences. Finding his health declining, he repaired, in 1757, to the south of France, but went in 1758 to Basel, where he died July 27, 1759.

MAURÁNÍPUR, a town in Jhānsi district, in the Northwestern Provinces of India. The population is 16,428.

MAURER, GEORG LUDWIG VON, a distinguished German jurist and statesman, was born at Erpolsheim, in the Bavarian Palatinate, November 2, 1790, and died at Munich, May 9, 1872.

MAURETANIA, or MAURITANIA (the former is the more correct form of the name, according to coins and inscriptions), was the name given in ancient geography to the district which constituted the northwestern angle of the African continent. It comprised a considerable part of the modern empire of Morocco, together with the western portion of Algeria. But its limits varied much at different times.

MAURICE (MAURICIUS), ST., and his companions are commemorated as martyrs by the Roman church on September 22d. The earliest extant form of the legend relating to them is that of Eucherius, bishop of Lyons about the middle of the fifth century, who tells us that Maurice was in command of the Theban legion (so called because raised in the Thebais) when it was sent into the West and attached to the army of Maximian. Themselves Christians to a man, its members refused to persecute their co-religionists, and for this,

after having twice been decimated, the legion was utterly destroyed by command of the emperor at Octodurum (Martigny), near Geneva.

MAURICE (MAURICIUS FLAVIUS TIBERIUS), emperor of the East from 582 to 602, was of Roman descent, but a native of Arabissus, in Cappadocia, where he was born about 539. He spent his youth at the court of Justin II., and, having joined the army, fought with distinction in the Persian war (578-581). At the age of forty-three he was declared Cæsar by the dying emperor Tiberius II., who bestowed upon him the hand of his daughter Constantina. The capital having declared against him, Maurice abdicated and withdrew to Chalcedon, but was pursued and put to death there after having witnessed the murder of five of his sons (November 27, 602).

MAURICE OF NASSAU, prince of Orange, the younger son of William the Silent, was born at Dillenburg in 1567, and was made governor of the United Provinces after the assassination of his father in 1584. He succeeded his brother as prince of Orange in 1618, and died at the Hague on April 23, 1625. For the leading features of his character and events of his life see HOLLAND.

MAURICE, duke and elector of Saxony, was the son of Duke Henry the Pious, and was born on March 21, 1521. He received a liberal education, and at an early age gave evidence of an energetic and ambitious temper. In 1541 he married Agnes, daughter of the landgrave Philip of Hesse, and succeeded his father as duke of Saxony, of the Albertine line. Although a Protestant, he held cautiously aloof from the League of Smalkald, and in 1542 and 1543 he received imperial favor by supporting Charles V. against the Turks and the French. In 1546, when Charles V. attacked the League of Smalkald, Maurice sided with the emperor, the result being that he was made elector of Saxony in place of his cousin John Frederick (of the Ernestine line), who was taken prisoner and deposed. In 1551 Maurice concluded a treaty with Henry II. of France against the emperor, and an alliance was also formed with several German princes. Charles V. refused to believe in the reality of the danger; but in March, 1552, he was startled by the intelligence that Henry II. had entered Germany as an invader, and that Maurice was hastening southward at the head of a powerful army. John Frederick and Philip were at once released, and the emperor, after an ignominious flight, was compelled to sign the treaty of Passau. After the reëstablishment of peace Maurice fought for some time against the Turks in Hungary; he then returned to Saxony, and associated himself with the alliance against Margrave Albert of Brandenburg, by whom the treaty of Passau had not been recognized. At Sievershausen, on July 9, 1553, the margrave was defeated; but during the battle Maurice was wounded, and two days afterward he died in his tent.

MAURICE, JOHN FREDERIC DENISON, better known without his first name, an English clergyman and theologian, was born in the year 1805, and died April 1, 1872.

MAURITIUS, formerly called the ISLE OF FRANCE, an island in the southwestern portion of the Indian Ocean, 550 miles east of Madagascar, and 115 miles northeast of the island of Réunion, 940 miles southeast of the Seychelles, 2,300 miles from the Cape of Good Hope, and 9,500 miles from England *via* Aden and Suez. The island is irregularly elliptical—somewhat triangular in shape—and is 36 miles long from north-northeast to south-southwest, and about 23 miles broad. It is 130 miles in circumference, and its total area is about 713 square miles. The island is surrounded by coral reefs, so that the ports are difficult of access. Population, 360,000.

MAURUS, ST., according to the Roman Breviary (January 15th), was a Roman of noble birth, and while still a child was placed by his father Eutychius under the discipline of St. Benedict, where he soon became a model of all the virtues and endowed with the gift of miracles. Sent by his master into Gaul, he founded a monastery over which he presided for forty years. When he died, in 565, he was over seventy.

MAURY, JEAN SIFFREIN, cardinal and archbishop of Paris, the great opponent of Mirabeau in the constituent assembly, and esteemed his rival in eloquence, was the son of a poor cobbler, and was born in 1746 at Valréas in the Venaissin, the district in France which belonged to the pope. His quickness was soon observed by the priests of Avignon, where he was educated and took orders. He became a favorite preacher in Paris, and was Lent preacher at court in 1781, when King Louis XVI. said of his sermon, "If the abbé had only said a few words on religion he would have discussed every possible subject." In 1781 he obtained the rich abbey of Lions, worth 20,000 livres a year, and in 1785 he was elected to the Academy. His morals were as loose as those of his great rival Mirabeau, but he was famed in Paris for his wit and gayety as well as for his eloquence and his immorality. In 1789 he was elected a member of the states-general by the clergy of Péronne, and from the first proved to be the most able and persevering defender of the *ancien régime*. His life was often in danger among the people, but his ready wit always saved it, and it was said that one *bon mot* would preserve him for a month. At last, in 1792, he found it necessary to fly from Paris. When he did emigrate he found himself regarded as a kind of martyr to the church and the king, and was at once named cardinal, archbishop *in partibus*, and extra nuncio to the diet at Frankfort. He was finally made bishop of Montefiascone, and settled down in that little Italian town. In 1804 he began to prepare his return to France by a well-turned letter to Napoleon, congratulating him on restoring religion to France once more. In 1806 he did return; in 1807 he was again received into the Academy; and in 1810, on the refusal of Cardinal Fesch, was made archbishop of Paris. On the restoration of the Bourbons he was summarily turned out of the Academy, and sent to Rome to answer for his disobedience to the pope. There he was imprisoned in the castle of St. Angelo for six months, and died in 1817, a year or two after his release.

MAURY, MATTHEW FONTAINE, American naval officer and hydrographer, was born in Spottsylvania county, Va., January 14, 1806. In 1825 he entered the American navy as midshipman, circumnavigating the globe in the *Vincennes*, during a cruise of four years. In 1836 he was made lieutenant and gazetted astronomer to an exploring expedition. In 1839 he met with an accident which resulted in permanent lameness, and unfitted him for active service. Maury was placed in charge of the Depot of Charts and Instruments, out of which have grown the United States Naval Observatory and the Hydrographic Office. He labored assiduously and with complete success to place the depot in a state of efficiency. While in the *Vincennes* and in subsequent cruises, Maury made many observations as to the winds and currents, and when in charge of the Hydrographic Office he set himself to collect further data by distributing to captains of vessels specially prepared log-books. So successful was he in this enterprise that in the course of nine years he had collected a sufficient number of logs to make two hundred manuscript volumes, each with about two thousand five hundred days' observations. One result was to show the necessity for combined action on the part of maritime nations in regard to ocean meteorology. This led to ar

international conference at Brussels in 1853, which produced the greatest benefit to navigation as well as indirectly to meteorology. One result was the establishment of the meteorological department of the English Board of Trade, now known as the Meteorological Office, which adopted Maury's model log-books. In 1853 he published his *Letters on the Amazon and Atlantic Slopes of South America*, and in 1855 he was promoted to the rank of commander. On the outbreak of the American civil war in 1861, Maury threw in his lot with the South, and, having lost nearly his all, retired to England, where he was presented with a handsome testimonial raised by public subscription. Afterward he became imperial commissioner of emigration to Maximilian of Mexico, on whose death he took up his residence in Virginia, where he died on February 1, 1873.

MAUSOLUS, or according to his coins *Maussolus*, a king of Caria, whose reign probably began in 377 and terminated with his death in 353 B.C. He is best known from the tomb erected for him by his widow Artemisia with such cultured magnificence that the name of mausoleum has become the generic title of all similar monuments.

MAXENTIUS, MARCUS AURELIUS VALERIUS, Roman emperor from 306 to 312, was the son of Maximianus Herculus, and the son-in-law of Galerius, but on account of his vices and incapacity was left out of account in the division of the empire which took place in 305. A variety of causes, however, had produced strong dissatisfaction at Rome with many of the arrangements established by Diocletian, and the public discontent on October 28, 306, found expression in the massacre of those magistrates who maintained their loyalty to Severus and in the election of Maxentius to the imperial dignity—an election in which the rest of Italy, as well as Africa, concurred. With the help of his father, Maxentius was enabled to put Severus to death and to repel the invasion of Galerius; his next steps were first to banish Maximian, and then, after achieving a military success in Africa against one Alexander, to declare war against Constantine for the conduct toward the old emperor of which he in turn had been guilty at Marseilles. The contest resulted in the defeat of Maxentius at Saxa Rubra, and his death by drowning in the Tiber at the Milvian Bridge on October 28, 312. (See CONSTANTINE.)

MAXIMA AND MINIMA. The consideration of the greatest or the least value of a variable quantity, that is restricted by certain conditions, is a problem of which several simple cases were investigated by the early Greek geometers. In the progress of mathematics the terms maxima and minima have come to be used to imply, not the absolutely greatest and least values of a variable magnitude, but the value which it has at the moment it ceases to increase and begins to decrease, or *vice versa*. For example, if it be said that the height of the barometer is a maximum at any instant it means that up to that time the barometer was rising and then began to fall. In this way it is possible that there should be several maxima and minima in the course of one day, and that one of the minima should be greater than one of the maxima.

MAXIMIANUS, MARCUS AURELIUS VALERIUS, surnamed HERCULIUS, Roman emperor from 286 to 305, and again in a doubtful manner for some time prior to 308, was by birth a Pannonian peasant, but achieved great distinction in the course of long service in the army in almost every quarter of the empire, and, having been made Cæsar by Diocletian in 285, received the title of Augustus in the following year (April 1, 286), with the honorary appellation of Herculus. In 287 he suppressed the rising of the peasants (Bagaudæ) in

Gaul, but in 289, after a three years' struggle, his colleague and he were compelled to acquiesce in the assumption by his lieutenant Carausius of the title of Augustus in Britain. After 292, Maximian left the care of the Rhine frontier to Constantius Chlorus, who had been designated Cæsar in that year, but in 297 his arms achieved a rapid and decisive victory over the barbarians of Mauretania, and in November, 303, he shared at Rome the triumph of Diocletian, the last pageant of the kind ever witnessed by that city. On May 1, 305, the day of Diocletian's abdication, he also divested himself of the imperial dignity at Milan, and retired to a villa in Lucania; in the following year, however, he was induced to reassume the purple. In 307 he brought the emperor Severus a captive to Rome, and also compelled the retreat of Galerius, but in 308 he was himself driven by Maxentius from Italy into Illyricum. Here a false report was received, or invented, of the death of Constantine, at that time absent on the Rhine, and Maximian at once grasped at the succession, but was soon driven to Marseilles, where, having been delivered up to his pursuers, he strangled himself in 310 (February).

MAXIMIANUS, GALERIUS VALERIUS, usually referred to by his name GALERIUS, Roman emperor from 305 to 311, was born near Sardica in Dacia, and served with distinction as a soldier under Aurelian and Probus, and in 292 was designated Cæsar along with Constantinus, receiving in marriage Diocletian's daughter Valeria, and at the same time having assigned to him as his special charge the care of the Illyrian provinces. In 296, at the beginning of the Persian war, he was removed from the Danube to the Euphrates. In 305, on the abdication of Diocletian and Maximian, he at once assumed the title of Augustus, along with Constantius, his former colleague, and having procured the promotion to the rank of Cæsar, of Severus, a faithful servant, and Daza (Maximinus), his nephew, he hoped, on the death of Constantius, to become sole master of the Roman world. This scheme, however, was defeated by the sudden elevation of Constantine at York on the death of his father, and by the action of Maximian and Maxentius in Italy. He died—of the *morbus pedicularis*, it is said—in May, 311.

MAXIMILIAN I., Holy Roman Emperor, the son of the emperor Frederick III., was born on March 22, 1459. In 1477 he married Mary, daughter of Charles the Bold of Burgundy, thus securing for his family the possessions of the house of Burgundy; and by the marriage of his son Philip with the infant Joana, in 1496, he prepared the way for the association of Spain with the empire under his grandson, Charles V. In 1486 Maximilian was chosen king of the Romans, and in 1493, after the death of his father, he succeeded to the imperial throne. Through the influence of his second wife, Blanca Sforza, daughter of Duke Galeazzo Sforza of Milan, he was induced to contend for supremacy in Milan and Naples; but his resources were inadequate for war on equal terms with the kings of France, Charles VIII. and Louis XII. In 1499 he carried on an unsuccessful war with the Swiss confederates, the result of which was that, by the peace of Basel, the confederates became practically independent of the empire. On the other hand, he was singularly fortunate in increasing the power of the house of Austria. By the death of his cousin, the archduke Sigismund, he inherited Tyrol; he also received Görz, Gradisca, the Pusterthal, and a part of Bavaria; and by the marriage of two of his grandchildren with children of the king of Hungary and Bohemia he took the first step toward the ultimate incorporation of these countries with the Austrian hereditary territories. At Wells, in Upper Austria, on January 12, 1519, he died.

MAXIMILIAN II., Holy Roman emperor, son and successor of Ferdinand I., was born at Vienna on August 1, 1527. In 1562 he became king of Bohemia and king of the Romans, in 1563 king of Hungary, and in 1564 emperor. At the time of his accession to the imperial throne Hungary was at war with Turkey. The sultan Soliman II. was conciliated by the cession of all the territories he had conquered in Hungary, and by the promise of a yearly tribute of 300,000 florins. Soon afterward Soliman renewed the war on behalf of the prince of Transylvania; but after his death, in 1566, his successor, Selim, concluded with Maximilian an armistice of eight years. Maximilian's brothers, Ferdinand and Charles, fought incessantly against Protestantism in their respective lands; but it was tolerated by Maximilian in Austria, Bohemia, and Hungary. His authority, however, was greatly limited by the influence of the Jesuits. He died on October 12, 1576. Of his eight children (six sons and two daughters) two—Rudolph II. and Matthias—became emperors.

MAXIMILIAN, archduke of Austria (Ferdinand Maximilian Joseph) and emperor of Mexico, was the second son of the archduke Francis Charles, and was born in Vienna on July 6, 1832. He was trained for the navy, and ultimately attained a high command in that branch of his country's service. In February, 1857, he was appointed governor of the Lombardo-Venetian kingdom, and in the same year he married the Princess Charlotte, daughter of Leopold I., king of the Belgians. On the outbreak of the war of 1859, he retired into private life, chiefly at Trieste, until 1863, when at the instance of Napoleon III. he accepted the crown which had been offered to him by the notables of Mexico. He landed at Vera Cruz on May 28, 1864, but from the commencement of his reign found himself involved in difficulties of the most serious kind, which in 1866 made apparent to almost everyone outside of Mexico the necessity for his abdicating. This, however, he declined to do. Withdrawing, in February, 1867, to Querétaro, he there sustained a siege for several weeks, but on May 15th resolved to attempt an escape through the enemy's lines. He was, however, arrested before he could carry out this resolution, and, after trial by court-martial, was condemned to death. The sentence was carried out on June 19, 1867. (See MEXICO.)

MAXIMINUS, **CAIUS JULIUS VERUS**, Roman emperor from 235 to 238, was of barbarian parentage, his father being a Goth and his mother an Alan, and was born in a village on the confines of Thrace, where his immense stature and enormous feats of strength first drew the attention of the emperor Septimius Severus. On March 19, 235, the troops saluted him emperor. The three years of his reign, which were spent wholly in the camp, were marked by great cruelty and oppression; the widespread discontent thus produced culminated in a revolt in Africa and the assumption of the purple by **GORDIANUS**, (*q.v.*) Maximin, who was in Pannonia at the time, marched against Rome, and passing over the Julian Alps descended on Aquileia; while detained before that city he and his son were murdered in their tent by a body of prætorians. Their heads were cut off and dispatched to Rome, where they were burnt on the Campus Martius by the exultant crowd (May, 238).

MAXIMINUS, **GALERIUS VALERIUS**, Roman emperor from 308 to 314, was originally an Illyrian shepherd, and bore the name of Daza. He rose to high distinction after he had joined the army, and in 305 he was raised by his uncle to the rank of Cæsar, with the honorary appellation of **Jovius**, Syria and Egypt being the government assigned to him. In 308, after the ele-

vation of Licinius, he insisted on receiving the title of Augustus; on the death of Galerius, in 311, he succeeded to the supreme command of the provinces of Asia, and, when Licinius and Constantine began to make common cause with one another, Maximin entered into a secret alliance with Maxentius. He came to an open rupture with Licinius in 313, sustained a crushing defeat in the neighborhood of Heraclea on April 30th, and, having fled first to Nicomedia and afterward to Tarsus, perished at the latter city in August following.

MAXIMUS, the name of four Roman emperors. In chronological order the first was M. Clodius Pupienus Maximus, who was associated with Balbinus in the imperial dignity by the senate for a short time in 238, before and after the death of the hated Maximin. The second was Magnus Clemens Maximus, a native of Spain, who shared the imperial dignity with Valentinian and Theodosius from 383 to 388. The third, Maximus Tyrannus, was made emperor in Spain by the Roman general Gerontius, who had rebelled against Constantine in 408. After the defeat of Gerontius at Arles, and his subsequent death in 411, Maximus renounced the imperial title and was permitted by Constantine to retire into private life. Lastly, Petronius Maximus was a member of the higher Roman nobility, and had held a large number of public offices, including those of præfectus Romæ (420) and of præfectus Italiæ (439-441 and 445). He was one of the intimate associates of Valentinian, who received his assistance in the palace intrigues which led to the death of Aetius in 454; but a brutal outrage committed on the wife of Maximus by the emperor turned his friendship into the bitterest hatred. Maximus was proclaimed emperor immediately after Valentinian's murder in March, 455, but reigned for less than three months, being murdered by some Burgundian mercenaries.

MAXIMUS, **SR.**, abbot of Chrysopolis, known as "the Confessor," from his orthodox zeal in the Monothelite controversy, or as "the monk," was born of noble parentage at Constantinople about the year 580. Educated with great care, he early became distinguished by his talents and acquirements, and some time after the accession of the emperor Heraclius, in 610, was made his private secretary. In 630 he abandoned the secular life and entered the monastery of Chrysopolis (Scutari), actuated, it was believed, less by any longing for the life of a recluse than by the dissatisfaction he felt with the Monothelite leanings of his master. The date of his promotion to the abbacy is uncertain. In 662 he was brought to Constantinople and was condemned by a synod there to be scourged, to have his tongue cut out by the root, and his right hand chopped off. After this sentence had been carried out he was again banished to Lazica, where he died, August 13, 662.

MAXWELL, **JAMES CLERK**, born in 1831, was the last representative of a younger branch of the well-known Scottish family of Clerk of Penicuik. He was educated at the Edinburgh Academy (1840-47) and the university of Edinburgh (1847-50). Entering at Cambridge in 1850, he spent a term or two in Peterhouse, but afterward migrated to Trinity. He held the chair of natural philosophy in Marischal College, Aberdeen, from 1856 till the fusion of the two colleges there in 1860. For eight years subsequently he held the chair of physics and astronomy in King's College, London, but resigned in 1868 and retired to his estate of Glenlair in Kirkcudbrightshire. He was summoned from his seclusion, in 1871, to become the first holder of the newly-founded professorship of experimental physics in Cambridge; and it was under his direction that the plans of the Cavendish laboratory were prepared. For more than half of his brief life he held a prominent po-

sition in the very foremost rank of natural philosophers. He died in 1879.

MAXWELL, SIR WILLIAM STIRLING-, BART., man of letters, was born at Kenmure, near Glasgow, in 1818, and died in 1878.

MAY, the fifth month of our modern year, was the third of the old Roman calendar. The name is of doubtful origin. Ovid suggests the three derivations of *majestas*, *majores* (the *patres* of the old Roman city), and *Maia*, the mother of Mercury, to whom the Romans were accustomed to sacrifice on the first day of the month. It was considered unlucky among the Romans to contract marriages during this month, on account of the celebration of the Lemuria—a superstition of which traces are still to be found among ourselves. In the Roman Catholic Church May is known as "the month of Mary."

MAYA. See MEXICO.

MAYBOLE, a burgh of barony and market-town of Scotland, in the county of Ayr. Population, 4,500.

MAYENCE. See MAINZ.

MAYENNE, a department of northwestern France, three-fourths of which formerly belonged to Lower Maine and the remainder to Anjou, is bounded on the north by Manche and Orne, on the east by Sarthe, on the south by Maine-et-Loire, and on the west by Ille-et-Vilaine, having a maximum length from north to south of fifty-one miles, a breadth of thirty-nine miles, and an area of 1,996 square miles. Its ancient geological formations connect it with Brittany. The highest point of the department, and indeed of the whole northwest of France, is the Mont des Avaloirs (1,368 feet). Hydrographically Mayenne belongs to the basins of the Loire, the Vilaine, and the Sélune; the first-mentioned has the larger part of the entire area. The climate of Mayenne, which is that of the Sequanian region, is generally healthy except in the neighborhood of the numerous marshes. Of the entire area two-thirds are arable and a twentieth is under wood. The population is 343,167.

MAYENNE, capital of an arrondissement in the above department of France, is an old feudal town irregularly built on two hillocks which overlook the river Mayenne, at the point where the railway from Caen to Laval is joined by that from Fougères to Alençon. The old castle still has toward the river five towers, one of which has retained its conical roof; the vaulted chambers and chapel are ornamented in the style of the thirteenth century; the building is now used as a prison. The population is 11,000.

MAYER, JOHANN TOBIAS, one of the greatest of last century's astronomers, was born at Marbach in Würtemberg, February 17, 1723. He died February 20, 1762.

MAYER, JULIUS ROBERT, was born at Heilbronn in 1814, studied medicine at Tübingen, Munich, and Paris, and, after a journey to Java in 1840 as surgeon of a Dutch vessel, obtained a medical post in his native town. He claims recognition as an independent *a priori* propounder of the "First Law of Thermodynamics," but more especially as having early and ably applied that law to the explanation of many remarkable phenomena, both cosmical and terrestrial. Mayer died in 1818.

MAYHEM (MAIM), an old term of the law signifying an assault whereby the injured person is deprived of a member proper for his defense in fight, *e.g.*, an arm, a leg, a fore tooth, etc. The loss of an ear, jaw tooth, etc., was not mayhem. The most ancient punishment in English law was retaliative—*membrum pro membro*, but ultimately at common law fine and imprisonment.

MAYKOP, a town of the Caucasus, Russia, in the province of Kuban, on the Byelaya, a tributary of the

Kuban, ninety-three miles to the southeast of Yekaterinodar, the capital of the province. Owing to its position in a very fertile country where settlers from Russia found plenty of rich soil which had been abandoned by the natives, Maykop has become a wealthy town, and its population has rapidly increased to 22,550.

MAYNOOTH, a village in the county of Kildare, province of Leinster, Ireland, is situated on the Royal Canal and on the Midland Great Western Railway, fifteen miles northwest of Dublin. The Royal Catholic College of Maynooth, instituted by the Irish parliament in 1765, is the chief seminary for the education of the Roman Catholic clergy of Ireland. It was supported by a parliamentary grant of \$130,000 a year, which at the disestablishment of the Irish Church in 1869 was commuted by the payment of a capital sum fourteen times its amount. The building is a fine Gothic structure by Pugin, erected by a parliamentary grant obtained in 1846.

MAYO, a maritime county on the west coast of Ireland, province of Connaught, is bounded north and west by the Atlantic Ocean, northeast by Sligo, east by Roscommon, southeast and south by Galway. Its greatest length from north to south is about seventy-five miles, and its greatest breadth about sixty-five miles. The total area is 1,318,400 acres, or 2,060 square miles.

About two-thirds of the boundary of Mayo is formed by sea, and the coast is very much indented, and abounds in picturesque scenery. The principal inlets are Killary Harbor, between Mayo and Galway; Clew Bay, in which are the harbors of Westport and Newport; Blacksod Bay and Broad Haven, which form the peninsula of the Mullet; and Killala Bay, between Mayo and Sligo. The islands are very numerous, the principal being Inishturk (area 1,445 acres, and population 132 in 1881), near Killary Harbor; Clare Island (area 3,949 acres, population 62), at the mouth of Clew Bay, where there are many islets all formed of drift; and Achil (area 35,838 acres, population 5,070), the largest island in Ireland.

There are some very fertile regions in the level portions of the county, but in the mountainous districts the soil is poor, the holdings are subdivided beyond the possibility of affording proper sustenance to their occupiers, and, except where fishing is combined with agricultural operations, the circumstances of the peasantry are among the most wretched of any district of Ireland.

In 1881 there were 179,343 acres, or less than one-eighth of the whole area, under crops, while 545,040 were pasture, 10,702 woods, and 521,673 waste.

From 77,508 in 1760 the population gradually increased till in 1841 it was 388,887, but in 1851 it had diminished to 274,499, in 1871 to 246,030, and in 1881 to 245,212, of whom 119,421 were males and 125,791 females.

MAYOR. See MUNICIPALITY.

MAYOTTO. See COMORES.

MAYSVILLE, the capital of Mason county, Ky., lies on the south bank of the Ohio, sixty-nine miles northeast of Lexington by rail. Settled in 1784 and incorporated in 1833, it has grown into a busy place with public buildings, flour-mills, plow-factories, etc., and is one of the principal hemp-markets in the United States. Population in 1890, 5,350.

MAZAMET, an industrial town in the department of Tarn, France, stands on the northern slope of the Montagnes Noires (part of the Cevennes), and on the Arnette, a tributary of the Tarn by the Agout. In last century it was an insignificant village, but at present it has 14,000 inhabitants, an increase of prosperity due to the introduction of the manufacture of a particu-

lar kind of woolen fabric sold almost exclusively in France.

MAZANDARÁN, a province of northern Persia, lying between the Caspian Sea and the Elbúrz range, and bounded east and west by the provinces of Astrábád and Gilán respectively, is 220 miles in length and 60 miles in (mean) breadth, with an area of about 10,000 square miles and a population estimated at from 150,000 to 200,000.

MAZARIN, JULES, cardinal, the successor of Richelieu, and forerunner of Louis XIV., was the elder son of Pietro Mazarini, the intendant of the house of Philip Colonna, and his wife Ortensia Buffalini, a connection of the Colonnas, and was born at Piscina in Abruzzi on July 14, 1602. He was educated by the Jesuits at Rome till his seventeenth year, when he accompanied Jerome Colonna as chamberlain to the university of Alcalá in Spain. On his return to Rome he took his degree as Doctor Utriusque Juris, and then became captain of infantry in the regiment of Colonna, which took part in the war in the Valtelline. During this war he gave proofs of much diplomatic ability, and Pope Urban VIII. intrusted him, in 1629, with the difficult task of putting an end to the war of the Mantuan succession. His success marked him out for further distinction. He was presented to two canonries in the churches of St. John Lateran and Sta. Maria Maggiore, although he had only taken the minor orders, and had never been consecrated priest; he negotiated the treaty of Turin between France and Savoy in 1632, became vice-legate at Avignon in 1634, and nuncio at the court of France from 1634-36. He accepted Richelieu's offer of entering the service of the king of France, and in 1639 became a naturalized Frenchman. In 1640 Richelieu sent him to Savoy, where the regency of Christine, the duchess of Savoy, and sister of Louis XIII., was disputed by her brothers-in-law, the princes Maurice and Thomas of Savoy, and he succeeded not only in firmly establishing Christine but in winning over the princes of France. This great service was rewarded by his promotion to the rank of cardinal on the presentation of the king of France in December, 1641. On December 4, 1642, Cardinal Richelieu died, and on the next day the king sent a circular letter to the officials ordering them to send in their reports to Cardinal Mazarin, as they had formerly done to Cardinal Richelieu. Mazarin was thus acknowledged supreme minister, but he still had a difficult part to play.

His measures were ably taken, and when the king died on May 14, 1643, to everyone's surprise her husband's minister remained the queen's. The king had by a royal edict cumbered the queen-regent with a council and other restrictions, and it was necessary to get the parliament of Paris to overrule the edict, and make the queen absolute regent, which was done with the greatest complaisance. Now that the queen was all-powerful, it was expected she would at once dismiss Mazarin and summon her own friends to power. Mazarin had inherited the policy of France during the Thirty Years' War from Richelieu. He had inherited his desire for the humiliation of the house of Austria in both its branches, his desire to push the French frontier to the Rhine and maintain a counterpoise of German states against Austria, his alliances with the Netherlands and with Sweden, and his four theaters of war—on the Rhine, in Flanders, in Italy, and in Catalonia. He made one fatal mistake—he dreamt of the French frontier being the Rhine and the Scheldt, and that a Spanish princess might bring the Spanish Netherlands as dowry to Louis XIV. This roused the jealousy of the United Provinces, and they made a separate peace with Spain in January, 1648; but the valor of the French generals

made the skill of the Spanish diplomatists of no avail, for Turenne's victory at Zusmarshausen, and Condé's at Lens, caused the peace of Westphalia to be definitely signed in October, 1648. The origin of both the Frondes was partly Mazarin's fault. As the war progressed, Mazarin had steadily followed Richelieu's policy of weakening the nobles on their country estates. Whenever he had an opportunity he destroyed a feudal castle, and by destroying the towers which commanded nearly every town in France, he freed such towns as Bourges, for instance, from their long practical subjection to the neighboring great lord.

The Fronde over, Mazarin had to build up afresh the power of France at home and abroad. It is to his shame that he did so little at home. Beyond destroying the brick and mortar remains of feudalism, he did nothing for the people. But abroad his policy was everywhere successful, and opened the way for the policy of Louis XIV. He at first, by means of an alliance with Cromwell, recovered the northwestern cities of France, though at the price of yielding Dunkirk to the Protector. On the Baltic, France guaranteed the treaty of Oliva between her old allies Sweden, Poland, and Brandenburg, which preserved her influence in that quarter. In Germany he, through Lionne, formed the league of the Rhine, by which the states along the Rhine bound themselves under the headship of France to be on their guard against the house of Austria. By such measures Spain was induced to sue for peace, which was finally signed in the Isle of Pheasants on the Bidasoa, and which is known as the treaty of the Pyrenees. By it Spain recovered Franche Comté, but ceded to France Roussillon, and much of French Flanders; and, what was of greater ultimate importance to Europe, Louis XIV. was to marry a Spanish princess, who was to renounce her claims to the Spanish succession if her dowry was paid, which Mazarin knew could not happen at present from the emptiness of the Spanish exchequer. He returned to Paris in declining health, and did not long survive the unhealthy sojourn on the Bidassoa; after some political instruction to his young master, he passed away at Vincennes on March 9, 1661, leaving a fortune estimated at from 18,000,000 to 40,000,000 livres behind him, and his nieces married into the greatest families of France and Italy.

MAZATLAN, a city and seaport of Mexico, in the State of Cinaloa, on the coast of the Pacific, near the mouth of the Gulf of California. A large smuggling trade was formerly carried on in much the same lines as the present legitimate traffic—export of bullion, dye-stuffs, and pearls, and import of manufactured goods from Europe and fruits and vegetables from San Francisco. In 1878 the value of the imports was about \$3,000,000, that of the exports about \$1,500,000. The population, which contains a large floating element, is 15,000.

MAZEPPA, IVAN STEPHANOVITCH, a Cossack chief, best known as the hero of one of Lord Byron's poems, was born in 1644, of a noble family, at Mazepintzui, in the palatinate of Podolia. At an early age he became a page at the court of John Casimir, king of Poland. After some time he returned to his native province; but, engaging in an intrigue with a Polish matron of high rank, he was detected by the injured husband, and was sentenced to be bound naked on the back of an untamed horse. The animal on being let loose galloped off to its native wilds of the Ukraine. Mazeppa, half-dead and insensible, was released from his fearful position and restored to animation by some peasants. In a short time his agility, courage, and sagacity rendered him popular among the Cossacks. He was appointed secretary and adjutant to Samoilovitch, their hetman or

chief, and succeeded that functionary in 1687. The title of prince was afterward conferred upon him by his friend and patron, Peter the Great, who long believed confidently in his good faith, and banished or executed as calumnious traitors all who, like Palei, Kotchubey, and Iskra, ventured to accuse him of conspiring with the enemies of Russia. Bent, however, upon casting off the Russian yoke, Mazeppa became, in his seventieth year, and after much hesitation and inconstancy of purpose, an ally of the Swedish monarch, Charles XII. After the disastrous battle of Pultowa, fought, it is said, by his advice, Baturin, his capital, was taken and sacked by Menshikoff, and his name anathematized throughout the churches of Russia, and his effigy suspended from the gallows. A wretched fugitive, he escaped to Bender, but only to end his life by poison in 1709.

MAZZARA DEL VALLO, a city of Italy, on the coast of Sicily, in the province of Trapani, thirteen miles by rail southeast of Marsala. Population (1890), 13,000.

MAZZINI, GIUSEPPE, Italian patriot, was born on June 22, 1805, at Genoa, where his father, Giacomo Mazzini, was a physician in good practice, and a professor in the university. At the age of thirteen he began to attend classes in the faculty of arts at the university; he afterward studied anatomy with a view to following his father's profession, but finally (1826) graduated in laws. For some time after his admission as an advocate Mazzini was occupied in the *Ufficio dei Poveri*; but, although he seems to have discharged the duties arising from this with zeal and success, he never really overcame his repugnance to the dry and technical details of legal practice. The natural bent of his genius was toward literature, and, in the course of the four years of his nominal connection with the legal profession, he wrote a considerable number of essays and reviews, some of which have been wholly or partially reproduced in the critical and literary volumes of his *Life and Writings*. But in the meantime the "republican instincts" which he tells us he had inherited from his mother had been developing, and his sense of the evils under which Italy was groaning had been intensified; and at the same time he became possessed with the idea that Italians, and he himself in particular, "could and therefore ought to struggle for liberty of country." His literary articles accordingly became more and more suggestive of advanced liberalism in politics, and led to the suppression by government of the *Indicatore Genovese* and the *Indicatore Livornese* successively. Having joined the Carbonari, he soon rose to one of the higher grades in their hierarchy, and was intrusted with a special secret mission into Tuscany; but he was betrayed, while initiating a new member, to the authorities of Piedmont. He was imprisoned in the fortress of Savona on the western Riviera for about six months, when, a conviction having been found impracticable, he was released, but upon conditions involving so many restrictions of his liberty that he preferred the alternative of leaving the country. He withdrew accordingly into France, living chiefly in Marseilles. Soon after his release his prison meditations took shape in the programme of the organization which was destined soon to become so famous throughout Europe, that of *La Giovine Italia*, or Young Italy. Its publicly avowed aims were to be the liberation of Italy from both foreign and domestic tyranny, and its unification under a republican form of government; the means to be used were education, and, where advisable, insurrection by guerrilla bands; the motto was to be "God and the people," and the banner was to bear on one side the words "Unity" and "Independence" and on the other "Liberty," "Equality," and "Humanity," to describe

respectively the national and international aims. In April, 1831, Charles Albert, "the ex-Carbonari conspirator of 1821," succeeded Charles Felix on the Sardinian throne, and toward the close of that year Mazzini, making himself, as he afterward confessed, "the interpreter of a hope which he did not share," wrote the new king a letter, published at Marseilles, urging him to take the lead in the impending struggle for Italian independence. Clandestinely reprinted, and rapidly circulated all over Italy, its bold and outspoken words produced a great sensation, but so deep was the offense it gave to the Sardinian Government that orders were issued for the immediate arrest and imprisonment of the author should he attempt to cross the frontier. Toward the end of the same year appeared the important Young Italy "Manifesto;" and this was followed soon afterward by the society's *Journal*, which, smuggled across the Italian frontier, had great success in the objects for which it was written, numerous "congregations" being formed at Genoa, Leghorn, and elsewhere. Representations were consequently made by the Sardinian to the French Government, which issued an order for Mazzini's withdrawal from Marseilles (August, 1832); he lingered for a few months in concealment, but ultimately found it necessary to retire into Switzerland. From this point it is somewhat difficult to follow the career of the mysterious and terrible conspirator who for twenty years out of the next thirty led a life of voluntary imprisonment (as he himself tells us) "within the four walls of a room," and "kept no record of dates, made no biographical notes, and preserved no copies of letters." In 1833, however, he is known to have been concerned in an abortive revolutionary movement which took place in the Sardinian army; several executions took place, and he himself was laid under sentence of death. Before the close of the same year a similar movement in Genoa had been planned, but failed through the youth and inexperience of the leaders. At Geneva, also in 1833, Mazzini set on foot *L'Europe Centrale*, a journal of which one of the main objects was the emancipation of Savoy; but he did not confine himself to a merely literary agitation for this end. Chiefly through his agency a considerable body of German, Polish, and Italian exiles was organized, and an armed invasion of the duchy planned.

The frontier was actually crossed on February 1, 1834, but the attack ignominiously broke down without a shot having been fired. In April, 1834, the "Young Europe" association "of men believing in a future of liberty, equality, and fraternity for all mankind, and desirous of consecrating their thoughts and actions to the realization of that future," was formed, also under the influence of Mazzini's enthusiasm; it was followed soon afterward by a "Young Switzerland" society, having for its leading idea the formation of an Alpine confederation, to include Switzerland, Tyrol, Savoy, and the rest of the Alpine chain as well. But *La Jeune Suisse* newspaper was compelled to stop within a year, and in other respects the affairs of the struggling patriot became embarrassed. He was permitted to remain at Grenchen in Solothurn for a while, but at last the Swiss diet, yielding to strong and persistent pressure from abroad, exiled him about the end of 1836. In January, 1837, he arrived in London, where, for many months, he had to carry on a hard fight with poverty and the sense of spiritual loneliness so touchingly described by himself in the first volume of the *Life and Writings*. Ultimately, as he gained command of the English language, he began to earn a livelihood by writing review articles, some of which have since been reprinted, and are of a high order of literary merit. In 1839 he entered into relations with the revolutionary committees

sitting in Malta and Paris, and in 1840 he originated a workingmen's association, and the weekly journal entitled *Apostolato Popolare*, in which the admirable popular treatise "On the Duties of Man" was commenced.

The most memorable episode in his life during the same period was perhaps that which arose out of the conduct of Sir JAMES GRAHAM (*q.v.*), the home secretary, in systematically opening Mazzini's letters as they passed through the British postoffice, and communicating their contents to the Neapolitan Government—a proceeding which brought about the arrest and execution of the brothers Bandiera, Austrian subjects, who had been planning an expedition against Naples. The prolonged discussions in parliament, and the report of the committee appointed to inquire into the matter, did not, however, lead to any practical result, unless indeed the incidental vindication of Mazzini's character, which had been recklessly assailed in the course of debate. Mazzini did not share the enthusiastic hopes everywhere raised in the ranks of the Liberal party throughout Europe by the first acts of Pius IX., in 1846, but at the same time he availed himself, toward the end of 1847, of the opportunity to publish a letter addressed to the new pope, indicating the nature of the religious and national mission which the Liberals expected him to undertake. The leaders of the revolutionary outbreaks in Milan and Messina, in the beginning of 1848, had long been in secret correspondence with Mazzini; and their action, along with the revolution in Paris, brought him early in the same year to Italy, where he took a great and active interest in the events which dragged Charles Albert into an unprofitable war with Austria; he actually, for a short time, bore arms under Garibaldi immediately before the reoccupation of Milan, but ultimately, after vain attempts to maintain the insurrection in the mountain districts, found it necessary to retire to Lugano. In the beginning of the following year he was nominated a member of the short-lived provisional government of Tuscany formed after the flight of the grand-duke, and almost simultaneously, when Rome had, in consequence of the withdrawal of Pius IX., been proclaimed a republic, he was declared a member of the constituent assembly there. A month afterward, the battle of Novara having again decided against Charles Albert in the brief struggle with Austria, into which he had once more been drawn, Mazzini was appointed a member of the triumvirate, with supreme executive power. The opportunity he now had for showing the administrative and political ability which he was believed to possess was more apparent than real, for the approach of the professedly friendly French troops soon led to hostilities, and resulted in a siege which terminated, toward the end of June, with the assembly's resolution to discontinue the defense, and Mazzini's indignant resignation.

The surrender of the city on June 30th was followed by Mazzini's flight by way of Marseilles into Switzerland, whence he once more found his way to London. Here, in 1850, he became president of the National Italian Committee, and at the same time entered into close relations with Ledru-Rollin and Kossuth. He had a hand in the abortive rising at Mantua in 1852, and again, in February, 1853, a considerable share in the formidable insurrection which broke out at Milan; once more, in 1854, he had gone far with preparations for renewed action when his plans were completely disconcerted by the withdrawal of professed supporters, and by the action of the French and English Governments in sending ships of war to Naples. The year 1857 found him yet once more in Italy, where, for complicity in short-lived emeutes which took place at Genoa, Leghorn, and Naples, he was again laid under

sentence of death. Undiscouraged in the pursuit of the one great aim of his life by any such incidents as these, he returned to London, where he edited his new journal *Pensiere ed Azione*. In 1865, by way of protest against the still uncanceled sentence of death under which he lay, Mazzini was elected by Messina as delegate to the Italian parliament, but, feeling himself unable to take the oath of allegiance to the monarchy, he never took his seat. In the following year, when a general amnesty was granted after the cession of Venice to Italy, the sentence of death was at last removed, but he declined to accept such an "offer of oblivion and pardon for having loved Italy above all earthly things." In May, 1869, he was again expelled from Switzerland, at the instance of the Italian Government, for having conspired with Garibaldi; after a few months spent in England he set-out (1870) for Sicily, but was promptly arrested at sea and carried to Gaeta, where he was imprisoned for two months. For some time his health had been far from satisfactory, but the immediate cause of his death was an attack of pleurisy with which he was seized at Pisa, and which terminated fatally on March 10, 1872.

The Italian parliament by a unanimous vote expressed the national sorrow with which the tidings of his death had been received, the president pronouncing an eloquent eulogy on the departed patriot as a model of disinterestedness and self-denial, and one who had dedicated his whole life ungrudgingly to the cause of his country's freedom. A public funeral took place at Pisa on March 14, and the remains were afterward conveyed to Genoa, where they were interred in the presence of a vast concourse of people.

MAZZOLA. See PARMIGIANO.

MEAD, RICHARD, physician, was born August 11, 1673, at Stepney (near London). He died February 16, 1754.

MEADVILLE, the county seat of Crawford county, Penn., on the left bank of French Creek, a tributary of the Alleghany river, and at the junction of the Franklin branch with the main line of the New York, Pennsylvania and Ohio Railroad, 102 miles from Salamanca. It is a well-built town, maintains a large trade with the oil regions, and has railway and other machine works, glass-works, woolen-mills, and paper-mills. Population (1890), 9,520.

MEASLES, an acute infectious disease occurring mostly in children. It appears to have been known from an early period in the history of medicine, mention being made of it in the writings of Rhazes and others of the Arabian physicians in the tenth century. For long, however, its specific nature was not recognized, and it was held to be a variety of smallpox. After the non-identity of these two diseases had been established, measles and scarlet fever continued to be confounded with each other. It is only within a comparatively recent period that measles has come to be regarded as a distinct and independent malady.

Like the other eruptive fevers, to which class of diseases measles belongs, its progress is marked by several stages more or less sharply defined.

Measles as a disease derives its chief importance in the view of medical men from the risk, by no means slight, of certain complications which are apt to arise during its course, more especially inflammatory affections of the respiratory organs. These are most liable to occur in the colder seasons of the year and in very young and delicate children. Irritation of the respiratory passages is one of the symptoms of measles, but this subsides with the decline of the eruption. Not infrequently, however, these symptoms, instead of abating, become aggravated, and bronchitis of the capillary form (see BRONCHITIS), or pneumonia, generally of the

diffuse or lobular variety (see PNEUMONIA), impart a gravity to the case which it did not originally possess. By far the greater portion of the mortality in measles is due to its complications, of which those just mentioned are the most common, but which also include inflammatory affections of the larynx, with attacks resembling croup, and also diarrhœa assuming a dysenteric character. Or there may remain as direct results of the disease chronic ophthalmia, or discharge from the ears, with deafness, and occasionally a form of gangrene affecting the tissues of the mouth or cheeks and other parts of the body, leading to disfigurement and even endangering life.

Apart, however, from those immediate risks, it deserves to be borne in mind that in measles there appears to be a tendency in many cases for the disease to leave behind a weakened and vulnerable condition of the general health, which may render children, previously robust, delicate, and liable to chest complaints, and is, in not a few instances, the precursor of some of those tubercular affections to which the period of childhood and youth is liable.

These various effects or sequelæ of measles plainly indicate that although in itself a comparatively mild ailment, it cannot safely be regarded with indifference. Indeed it is doubtful whether any other disease of early life demands more careful watching as to its influence on the health. Happily, many of those attending evils now alluded to may by proper management be averted.

Measles is a disease of the earlier years of childhood. Like other infectious maladies, it is admittedly rare, though not unknown, in nurslings or infants under six months old. It is comparatively seldom met with in adults, but this is simply due to the fact that most persons have undergone an attack in early life, since, where this has not been the case, the old suffer equally with the young.

The treatment of measles embraces the preventive measures to be adopted in the case of an outbreak by the isolation of the sick at as early a period as possible. Epidemics have often, especially in limited localities, been curtailed by such a precaution. In families with little house accommodation this measure is frequently, for the reason already referred to regarding the communicable period of the disease, ineffectual; nevertheless where practicable it ought to be tried, for it is a grave error needlessly to expose the healthy children in a family to the risk of infection under the idea that they must necessarily take the disease at some time or other. The unaffected children should likewise be kept from school for a time (probably about three weeks from the outbreak in the family would suffice if no other case occur in the interval), and all clothing in contact with the patient should be subjected to disinfection or thorough washing. In extensive epidemics it is often desirable to close the schools of a locality for a time. As regards special treatment, in an ordinary case of measles little is required beyond what is necessary in febrile conditions generally. Confinement to bed in a somewhat darkened room, into which, however, air is freely admitted in such a manner as to avoid the risk of draughts, light nourishing liquid diet (soups, milk, etc.), and mild diaphoretic remedies, such as the acetate of ammonia or ipecacuanha, are all that is necessary in the febrile stage. When the catarrhal symptoms are very severe, the hot bath or warm packing to the body generally or the chest and throat afford relief, and the same measures may with advantage be adopted should the eruption be but feebly developed or tend to recede, and especially should convulsions set in. The serious chest complications of measles are to be dealt with by those measures applicable for the relief of the particular symp-

toms (see BRONCHITIS, PNEUMONIA). The inhalation of vapor and the use of the preparations of ammonia are of special efficacy. Diarrhœa is treated by the usual remedies, including carefully administered doses of Dover's powder, chalk, etc. During convalescence the patient must be guarded from exposure to cold, and for a time after recovery the state of the health ought to be watched with the view of averting the evils, both local and constitutional, which but too often follow this disease.

German Measles (Rötheln, or Epidemic Roseola) is a term applied to a contagious eruptive disorder having certain points of resemblance to measles, and, according to some observers, also to scarlet fever, but exhibiting its distinct individuality in the fact that it protects from neither of these diseases. It occurs most commonly in children, and is occasionally seen in extensive epidemics. Beyond confinement to the house in the eruptive stage, which, from the slight symptoms experienced, is often difficult of accomplishment, no especial treatment is called for. There is little doubt that the disease is often mistaken for true measles, and many of the alleged second attacks of the latter malady are probably cases of rötheln.

MEASUREMENT. Every system of geometrical measurement, as indeed the whole science of geometry itself, is founded on the possibility of transferring a fixed figure from one part of space to another with unchanged form.

Magnitudes which have only one dimension present the theory of measurement in its simplest form. The length of a straight line may be taken as an illustration of a one-dimensioned magnitude. The velocity of a moving particle, the temperature of a heated body, the electric resistance of a metal, all these and many others are instances of one-dimensioned magnitude, the measure of which is to be expressed by a single quantity. But there may be magnitudes which require more than a single measurement for their complete specification. Take, for instance, a four-sided field which has been duly surveyed. Of what is the measurement of this field to consist? If the number of acres in the field be all that is required, then the area is expressed by a simple reference to a number of standard acres. If, however, the entire circumstances of the field are to be brought into view, then a simple statement of the area is not sufficient. It can be easily shown that the surveyor must ascertain five independent quantities before the details of the shape of the field can be adequately defined. Four of these quantities may naturally be the lengths of the four sides of the field, the fifth may be one of the angles, or the area, or the length of one of the diagonals. Speaking generally, we may say that five distinct measurements will be necessary to define the field adequately. The actual choice of the particular measurements to be made is to a great extent arbitrary. The only condition absolutely necessary is that they shall be all independent and free from ambiguity. Once these five quantities are ascertained then all the other features of the figure are absolutely determined. For instance, the four sides and the diagonal being ascertained by measurement, then the other diagonal, the four angles, and the area can all be computed by calculation. The five quantities would determine everything about the field except its actual position on the surface of the earth. If we further desired to have the field exactly localized certain other quantities must be added. The latitude and the longitude of one specified corner of the field would completely indicate that corner, while the azimuth of one side from that corner would complete the definition of its position. We are thus led to see that for the complete delineation of every circumstance relating to the shape of the field and its locality eight different measure-

ments have been required. Two sets of eight measurements differing in any particular can never indicate the same field. It is very important to notice that the *number* of quantities required is quite independent of the particular nature of the measurements adopted. We might, for instance, have simply measured the latitude and the longitude of each of the four corners of the field. Once these quantities are known, then the shape of the field, its area, its angles, and its diagonals have all been implicitly determined. Here again we see that as two quantities are required to localize each of the four corners, so eight quantities will be required to fully determine the whole field.

In the operations of analytical geometry we are accustomed to specify the position of a point by the relation which it bears to certain fixed axes. By means of certain quantities, either altogether linear or partly linear and partly angular, we are enabled to specify the position of the point with absolute definiteness. These quantities are called the *coördinates* of the point. In a similar though more extended sense we may use the word "*coördinates*" to express the group of eight magnitudes which we have found to be adequate to the complete specification of the field. By the measurement of the field in the most complete sense of the term we mean the measurement of its eight *coördinates*.

Most of the quantities for which measurements are needed can be ultimately expressed by means of (1) a definite length, (2) a definite mass, or (3) a definite interval of time.

It is very important that the units thus referred to should be chosen judiciously, and it must be admitted that the units ordinarily used do not fulfill the conditions which a well-chosen system of units should fulfill. The most scientific system is beyond doubt that which has been suggested by the units committee of the British Association. In this system the unit of length is the *centimeter*, the unit of mass is the *gramme*, and the unit of time is the *second*, and the system is therefore often referred to for brevity as the C.G.S. system. The unit of force is termed the *dyne*, and it is defined to be the force which, acting upon a gramme of matter for a second, generates a velocity of a centimeter per second. The unit of work is the work done by this force working through a centimeter, and this unit is termed the *erg*. The unit of power is the power of doing work at the rate of one erg per second, and the power of an engine can be specified in ergs per second. By the prefixes deca, hecto, kilo, mega, we can express a magnitude equal to the unit multiplied by 10, 100, 1,000, or 1,000,000 respectively. On the other hand the prefixes deci, centi, milli, micro, signify the units divided by 10, 100, 1,000, or 1,000,000 respectively.

For comparison with the ordinary units the following statement will be useful. The weight of a gramme at any part of the earth's surface is about 980 dynes, or rather less than a kilodyne. The weight of a kilogramme is rather less than a megadyne, being 980,000 dynes.

MEATH, a maritime county of Ireland, in the province of Leinster, is bounded east by the Irish Sea, southeast by Dublin, south by Kildare and King's county, west by Westmeath, northwest by Cavan and Monaghan, and northeast by Louth. Its greatest length north and south is about forty miles, and its breadth east and west about forty-five miles. The total area comprises 578,560 acres, or about 904 square miles. Population (1890), 85,000.

MEAUX, capital of an *arrondissement*, and an episcopal see, in the department of Seine-et-Marne, France, and formerly chief town of Haute Brie, is situated twenty-eight miles east of Paris, on the Marne,

which runs through the town, and on the Paris and Strasburg Railway.

MECCA (*Makka*), the chief town of the Hijáz in Arabia, and the great holy city of Islám, is situated two camel marches (the resting-place being Bahra or Hadda in the Batn Marr), or about forty-five miles, almost due east, from Jidda, on the Red Sea.

It is said in the Koran that Mecca lies in a sterile valley, and the old geographers observe that the whole Haram or sacred territory round the city is almost absolutely without cultivation or date palms, while fruit-trees, springs, wells, gardens, and green valleys are found immediately beyond. Mecca in fact lies in the heart of a mass of rough hills, intersected by a labyrinth of narrow valleys and passes, and projecting into the Tiháma or low country on the Red Sea, in front of the great mountain wall that divides the coast lands from the central plateau, though in turn they are themselves separated from the sea by a second curtain of hills forming the western wall of the great Wády Marr.

Holding this position, and situated in a narrow and barren valley quite incapable of supporting an urban population, Mecca must have been from the first a commercial town. In the palmy days of South Arabia it was probably a station on the great incense route, and thus Ptolemy may have learned the name, which he writes Makoraba. At all events, long before Mohammed we find Mecca established in the twofold quality of a commercial center and a privileged holy place, surrounded by an inviolable territory (the Haram), which was not the sanctuary of a single tribe but a place of pilgrimage, where religious observances were associated with a series of annual fairs at different points in the vicinity.

The victory of Mohammedanism made a vast change in the position of Mecca. The merchant aristocracy became satraps or pensioners of a great empire; but the seat of dominion was removed beyond the desert, and though Mecca and the Hijáz strove for a time to maintain political as well as religious predominance, as will be related under MOHAMMEDAN EMPIRE, the struggle was vain, and terminated on the death of Ibn Zubeyr, the Meccan pretendant to the caliphate, when the city was taken by Hajjáj, (692 A.D.) On the other hand, the sanctuary and feast of Mecca received a new prestige from the victory of Islám. Purged of elements obviously heathenish, the Ka'ba (Caaba) became the holiest site, and the pilgrimage the most sacred ritual observance of Mohammedanism, drawing worshipers from so wide a circle that the confluence of the petty traders of the desert was no longer the main feature of the holy season. To this day the Meccans live by the Hajj—letting rooms, acting as guides and directors in the sacred ceremonies, as contractors and touts for land and sea transport, as well as exploiting for their own advantage the many benefactions that flow to the holy city; while the surrounding Bedouins derive a chief part of their support from the camel-transport it demands and from the subsidies and gifts by which they are engaged to protect or abstain from molesting the pilgrim caravans.

The fixed population of Mecca in 1878 was estimated by Assistant-Surgeon 'Abd el-Razzák at 50,000 to 60,000; but the materials for an estimate are very inadequate where there is so large a floating population, and that not merely at the proper season of pilgrimage, the pilgrims of one season often beginning to arrive before those of the former season have all dispersed. At the height of the season the town is much overcrowded, and the entire want of a drainage system is severely felt. Fortunately good water is tolerably plentiful; for, though the wells are mostly undrinkable, and even the

famous Zamzam water very unwholesome and tainted with sewage, the underground conduit from beyond 'Arafa, completed by Sultan Selim II. in 1571, supplies to the public fountains a sweet and light water, containing, according to 'Abd el-Razzák, a large amount of chlorides. The water is said to be free to townsmen, but is sold to the pilgrims at a rather high rate.

Mediaeval writers celebrate the copious supplies, especially of fine fruits, brought to the city from Táif and other fertile parts of Arabia. These fruits are still famous; rice and other foreign products are brought by sea to Jidda; mutton is plentifully supplied from the desert. The industries of Mecca all center in the pilgrimage; the chief object of every Meccan—from the notables and sheikhs, who use their influence to gain custom for the Jidda speculators in the pilgrim traffic, down to the cicerones, pilgrim brokers, lodging-house keepers, and semi-mendicant hangers-on at the holy places—being to pillage the visitor in every possible way. Thus the fanaticism of the Meccan is an affair of the purse; the mongrel population (for the town is by no means purely Arab) has exchanged the virtues of the Bedouin for the worst corruptions of Eastern town life, without casting off the ferocity of the desert, and it is hardly possible to find a worse certificate of character than the three parallel gashes on each cheek, called Tashrít, which are the customary mark of birth in the holy city. The unspeakable vices of Mecca are a scandal to all Islám, and a constant source of wonder to pious pilgrims.

Long before Mohammed the chief sanctuary of Mecca was the Ka'ba, a rude stone building, so named from its resemblance to a monstrous *astragalus* or die, of about forty feet cube, though the shapeless mass is not really an exact cube or even exactly rectangular. The Ka'ba has been rebuilt more than once since Mohammed purged it of idols and adopted it as the chief sanctuary of Islám, but the old form has been preserved except in secondary details; so that the "Ancient House," as it is titled, is still essentially a heathen temple, adapted to the worship of Islám by the clumsy fiction that it was built by Abraham and Ishmael by divine revelation as a temple of pure monotheism, and that it was only temporarily perverted to idol worship from the time when 'Amr ibn Lohay introduced the statue of Hobal from Syria till the victory of Islám. The black stone is a small, dark mass a span long, with an aspect suggesting volcanic or meteoric origin, fixed at such a height that it can be conveniently kissed by a person of middle size. It was broken by fire in the siege of 683 A.D., and the pieces are kept together by a silver setting. The history of this heavenly stone, given by Gabriel to Abraham, does not conceal the fact that it was originally a fetish, the most venerated of a multitude of idols and sacred stones which stood all round the sanctuary in the time of Mohammed. The Prophet destroyed the idols, but he left the characteristic form of worship—the *tawáf*, or sevenfold circuit of the sanctuary, the worshiper kissing or touching the objects of his veneration—and besides the black stone he recognized the so-called "southern" stone, the same, presumably, with that which is still touched in the *tawáf* at the Yemen corner. The ceremony of the *tawáf* and the worship of stone fetishes was common to Mecca with other ancient Arabian sanctuaries. Islám did away with the worship of idols; what was lost in interest by their suppression has been supplied by the invention of spots consecrated by recollections of Abraham, Ishmael, and Hagar, or held to be acceptable places of prayer.

The feeling of religious conservatism which has preserved the structural rudeness of the Ka'ba through so many centuries did not interfere with the adoption of

costly surface decoration. In Mohammed's time the outer walls were covered by a vail (or *kiswa*) of striped Yemen cloth. The magnificence of the caliphs substituted a covering of figured brocade, and the sultan still sends with each pilgrim caravan from Cairo a new *kiswa* of black brocade, adorned with a broad band embroidered with golden inscriptions from the Koran, as well as a richer curtain for the door.

The interior of the Ka'ba is now opened but a few times every year; there is a great scramble for admission—the portable staircase being seldom brought forward—and a great clamor for backshish; thus the modern descriptions, from observations made under difficulties, are not very complete.

After the Ka'ba the principal points of interest in the mosque are the well Zamzam and the Makám Ibráhím. The former is a deep shaft inclosed in a massive vaulted building paved with marble, and, according to Mohammedan tradition, is the source from which Hagar drew water for her son Ishmael.

MECHANICS. Strictly speaking, the derivation of this word should have prevented the use of it as the designation of a pure science. It has been, however, employed for a long period in English speech in the identical sense that the French attach to *Mécanique pure* or the Germans to *Reine Mechanik*. These terms are all employed to denote what we should much prefer to call *Abstract Dynamics*—the pure science which (as the derivation implies) treats of the action of Force upon Matter, but which is, correctly, the *Science of Matter and Motion*, or of *Matter and Energy*.

With the view of making clear from the outset the reason for the arrangement adopted in this article, we commence by stating Newton's *Axiomata, sive Leges Motus*, which form the entire basis of our subject. These laws will at once indicate the order in which the subject may most logically be treated.

Newton's Laws of Motion.

§ 1. I. Every body continues in its state of rest, or of uniform motion in a straight line, except in so far as it is compelled by force to change that state.

II. Change of (quantity of) motion is proportional to force, and takes place in the straight line in which the force acts.

III. To every action there is always an equal and contrary reaction; or the mutual actions of any two bodies are always equal and oppositely directed.

§ 2. These laws are to be considered as deductions from observation and experiment, and in no sense as having an *a priori* foundation. Their proof, so far as rigorous proof is attainable in physical matters, is commonly looked on as being furnished in the most conclusive form by observational astronomy. The *Nautical Almanac*, published usually about four years in advance, contains the predicted places of the sun, moon, and principal planets from day to day, in some cases from hour to hour, throughout the year. The predictions are entirely based upon the laws of motion (along with the law of gravitation), and could not possibly be accurate unless these laws are true. So thoroughly satisfactory has hitherto been the coincidence between prediction and observation that, when a deviation occurs, no one dreams of a defect in the principles of the reasoning. On the contrary, such deviations are utilized for the purpose of correcting our knowledge of the "elements" of the orbits of the moon and planets, or our estimates of the masses of these bodies; and, as in the brilliant investigations of Adams and Leverrier, they sometimes enable us to discover the existence and even assign the position of a planet never before seen.

§ 3. It is not clear in what order, or by whom, these

laws were first discovered. Galileo was undoubtedly acquainted with the first two; and Huygens, Wren, Hooke, and others were acquainted with the Third Law in some of its many applications. But they were first systematized, and, as we have seen, extended in a most important manner by Newton. Though they were sadly disfigured in Britain during the fifty years which elapsed after the revival of mathematics in the early part of this century, they have of late been restored to the form in which Newton gave them. This re-adoption of Newton's simple but comprehensive system has of itself aided in no small degree the recent rapid advance of science.

Comments on the Laws of Motion.

§ 4. Law I. First of all this law tells us what happens to a piece of matter which is left to itself, *i.e.*, not acted on by forces. It preserves its "state," whether of rest or of uniform motion in a straight line. This property is commonly called the "inertia" of matter, in virtue of which it is incapable of varying in any way its state of rest or motion. It may be the sport of forces for any length of time, but so soon as they cease to act it remains in the state in which it was left until they recommence their action on it. Hence, whenever we find the state of a piece of matter changing, we conclude that it is under the action of a force or forces. Thus, for the present, we have the definition of "force" as part of this First Law:

Force is whatever changes the state of rest or uniform motion of a body.

When a body originally at rest begins to move, we conclude that force is acting on it. And when a moving body is seen to change *either* the speed *or* the direction of its motion, we conclude that this is due to force.

§ 5. But there is much more than this, even in the First Law. What is "rest?" The answer must be that the term is relative. Absolute rest and absolute motion are terms to which we find it impossible to assign a meaning. Maxwell has well said (in his *Matter and Motion*):

"All our knowledge, both of time and place, is essentially relative. When a man has acquired the habit of putting words together, without troubling himself to form the thoughts which ought to correspond to them, it is easy for him to frame an antithesis between this relative knowledge and a so-called absolute knowledge, and to point out our ignorance of the absolute position of a point as an instance of the limitation of our faculties. Anyone, however, who will try to imagine the state of a mind conscious of knowing the absolute position of a point will ever after be content with our relative knowledge."

As will be seen later, the First Law gives us also a physical definition of "time," and physical modes of measuring it.

§ 6. Law II. What Newton designates by the word *motion* is, as he has clearly pointed out, the same as is expressed by *quantity of motion*, that for which we now usually employ the term "momentum." Its numerical value depends not only on the rate of motion, but also on the amount of matter, or "mass," of the moving body, and is directly proportional to either of these when the other is unaltered. But it is regarded by Newton as having direction as well as magnitude. It is, in fact, what in the language of quaternions is called a "vector." The change of such a quantity may be either in numerical magnitude, or in direction, alone, or simultaneously in both. We now see what this Second Law enables us to do: For

(a) Given the mass of a body, the force acting on it, and the time during which it acts, we can calculate the

change of motion. This is the direct problem of dynamics of a particle.

(b) Given the mass, and the change of velocity, we can calculate the magnitude and direction of the force acting. This is the *inverse* problem.

(c) We can compare, and so measure, forces by the changes of motion they produce in one and the same body.

(d) We can compare the masses of different bodies by finding what changes of velocity one and the same force produces in them.

(e) We can find the *one* force which is equivalent, in its action, to any given set of forces. For, however many changes of motion may be produced by the separate forces, they must obviously be capable of being compounded into a single change, and we can calculate what force would produce that.

§ 7. Hitherto we have spoken of *the* motion of a body—thus implying that all its parts are moving in exactly the same way. From this point of view, every body, however large, may be treated as if it were a single particle. But when the parts of a body have different velocities, as when a rigid body is rotating, or as when a non-rigid body is suffering a change of form, the question becomes much more complex. We cannot enter into a full explanation, but will take a couple of very simple cases to show the nature of the new difficulties, and thence the necessity for an additional law.

Suppose a bullet to be thrown in any direction. If we know with what force the earth attracts it, the calculation of the path it will pursue depends on the Second Law, which gives all the necessary preliminary information. But let two bullets be tied together by a string; we know by trial that each moves, in general, in a manner very different from that in which it would move if free. The path of each is now, usually, a tortuous curve, while its free path would be plane. It is no longer subject to gravity alone, but also to what is called the "tension" of the string. If we knew the amount of this tension on either of the bullets and its direction, we could calculate, by the help of the Second Law alone, all the circumstances of the motion of that bullet. But how are we to find this tension? Is it even the same for each bullet? This, if answered in the affirmative, would simplify matters considerably, but we should still require to know the amount and direction of the tension. It is clear that, without a further axiom, we cannot advance to a solution of the question.

§ 8. Law III. Furnished with this, in addition to our previous information, we can attack the question with more hope. We see by this law that, whatever force be exerted by the string on one of the bullets, an equal and opposite force, which must therefore be in the direction of the string, is exerted on the other. Still, the magnitude of these equal forces remains to be found. But the string in no way interferes with the motion of either bullet *unless it is tight, i.e.*, unless the distance between the bullets is equal to the length of the string. Hence, whenever the unknown force comes into play, at the same time there comes in a geometrical relation of relative position between the two bullets. *This supplies the additional equation necessary for the determination of the new unknown quantity.*

§ 9. As an additional illustration, suppose the string to be made of india-rubber. The Third Law tells us that the tensions it exerts on the bullets are still equal and opposite. But we no longer have the geometrical condition we had before. We have, however, what is quite sufficient, a knowledge of *how the tension of the string depends on its length*. Thus the tension can be calculated from the relative position of the bullets.

§ 10. What has now been said enables us to see the order in which the fundamental ideas should be taken up, so that the necessities of each should be provided for before its turn comes. An indispensable preliminary is the study of motion in the abstract, *i.e.*, without any reference to *what is moving*. This is demanded in order that we may be able to apply the Second Law. The science of pure motion, without reference to matter or force, is an extension of geometry by the introduction of the idea of time and the consequent idea of velocity. Ampère suggested for it the term *Cinématique*, or, as we shall write it, *Kinematics*. We include under it all changes of form and grouping which can occur in geometrical figures or in groups of points.

We shall then be prepared to deal with the action of force on a single particle of matter, or on a body which may be treated as if it were a mere particle. Thus we have the Dynamics of a Particle. This, again, splits into two heads, Statics and Kinetics of a particle. But all this requires the Second Law only. When we have two or more connected particles, or two particles attracting one another or impinging on one another, the Third Law is required. Next in order of simplicity come the Statics and Kinetics of a Rigid Solid. Then we have to deal with bodies whose form, etc., are altered by forces—flexible bodies, elastic solids, fluids, etc. Finally come the general principles, such as “conservation of energy,” “least action,” etc., which are deducible by proper mathematical methods from Newton’s Laws, and of which some at least, if we could more clearly realize their intrinsic nature, would probably be found to express even more simply than do Newton’s Laws the true fundamental principles of abstract dynamics.

MECHITHARISTS, a congregation of Armenian monks, in communion with the church of Rome, which has enjoyed papal recognition since 1712. Its founder was Mechithar, or Mechitar da Pietro, a native of Sebaste (Sivas) in Armenia, born on February 7, 1676; its rule resembles the Benedictine, prominent among the duties of its members being the proclamation of the gospel and the diffusion of good literature.

MECHLIN, or MALINES, a city of Belgium, in the province of Antwerp, on the river Dyle, about fourteen miles north of Brussels. The general aspect of the town, belted by a fine avenue of trees, with well-built houses, extensive gardens, and broad, airy streets and squares of proverbial cleanliness, is pleasing to the eye; there is, however, a lack of life and motion, a repose bordering on stagnation, and the area occupied by the town is much too extensive for the population. Mechlin was for many centuries, and is to this day, the religious metropolis of Flanders, and its monuments and curiosities are in general of a sacred description. The population of Mechlin in 1880 was 42,381.

MECKLENBURG, a territory in North Germany, on the Baltic Sea, corresponds with tolerable closeness to the old lower Saxon province of the same name, and is now unequally divided into the two grand-duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz. These are so closely related in history, political organization, natural features, and general development that it is convenient to treat them in a single article.

MECKLENBURG-SCHWERIN, the seventh state of the German empire in size and the eighth in population, is bounded on the north by the Baltic Sea, on the west by the principality of Ratzeburg and Lauenburg, on the south by Brandenburg and Hanover, and on the east by Pomerania and Mecklenburg-Strelitz. It embraces the duchies of Schwerin and Güstrow, the district of Rostock, the principality of Schwerin, and the barony of Wismar, besides several small “enclaves” in the adia-

cent territories. Its total area is about 5,117 square miles.

MECKLENBURG-STRELITZ, the eleventh state of the German empire in area and the nineteenth in population, consists of two detached parts, the duchy of Strelitz on the east of Mecklenburg-Schwerin, and the principality of Ratzeburg on the west. The first of these is bounded by Mecklenburg-Schwerin, Pomerania, and Brandenburg, the second by Mecklenburg-Schwerin, Lauenburg, and the territory of the free town of Lübeck. Their joint area is 1,126 square miles.

Mecklenburg-Schwerin and Mecklenburg-Strelitz are both limited monarchies under grand-dukes, who are hereditary in the male line. The reigning families are closely related, and possess mutual rights of succession; should both families become extinct, their possessions pass to Prussia. The constitution, which is common to both the duchies, exhibits few traces of the liberal tendency of modern politics.

MEDALS. See NUMISMATICS.

MEDEA, the daughter of Æetes, king of the Colchians. Medea was one of the “wise women” (witches or sorceresses) of antiquity, and perhaps, like Helen, was a human embodiment of some goddess connected with Eastern element-worship, possibly with Hera. For the story of her love for Jason the Argonaut, and of the revenge she took for his desertion of her for another bride, a Corinthian princess, Glauce, daughter of Creon, see ARGONAUTS and JASON.

MEDELLIN, a town of Colombia, South America, capital of the state of Antioquia, is situated at a height of 4,845 feet above the sea, in the valley of the Rio Porce, a right-hand tributary of the Rio Cauca. Though the population is estimated at 14,000, there is no great activity except on the market days, twice a week, when the buyers and sellers flock in from the country.

MEDFORD, a town in the United States, in Middlesex county, Mass., at the head of navigation on Mystic river, and five miles northwest of Boston by a branch of the Boston and Maine Railroad. It is a busy place, with a considerable variety of manufactures—woolens, carpets, buttons, bricks, leather, etc. Tufts College, situated near the town, on Walnut Hill, was founded by the Universalists in 1853, and named in honor of Charles Tufts, the donor of the seventy acres occupied by the building and its grounds. The endowment amounts to more than \$1,000,000. The population of Medford was 11,079 in 1889.

MEDHURST, WALTER HENRY, one of the most distinguished Protestant missionaries to the Chinese, was born in London in 1796, and died in 1857.

MEDIA. See PERSIA.

MEDICAL JURISPRUDENCE, or, as it is now more usually termed, FORENSIC MEDICINE, is that branch of state medicine which treats of the application of medical knowledge to the purposes of the law. The term medical jurisprudence, though sanctioned by long usage, is not an appropriate one; since the subject is, strictly speaking, a branch of medicine rather than of jurisprudence; it does not properly include sanitation or HYGIENE (*q.v.*), both this and medical jurisprudence proper being distinct branches of state medicine. The connection between medicine and the law was perceived long before medical jurisprudence was recognized, or had obtained a distinct appellation. It first took its rise in Germany, and subsequently, but more tardily, received recognition in Great Britain and America.

Forensic medicine, or medical jurisprudence proper as distinguished from hygiene, embraces all those questions which bring the medical man into contact with the law, and embraces (1) questions affecting the civil rights

of individuals, and (2) injuries to the person. Some of the aspects of medical jurisprudence, as here treated, refer exclusively to England, but the main text is applicable to the United States, the laws of which are founded in most respects on English custom and law.

I. QUESTIONS AFFECTING THE CIVIL OR SOCIAL RIGHTS OF INDIVIDUALS.

1. *Development of the Human Frame.*—The development of the physical and mental powers of the human being is a matter of the highest importance, and is a factor of great consequence in determining criminal responsibility, civil responsibility, or the power of giving validity to civil contracts, and in determining the personal identity of a living person or of a corpse. Human life is usually divided into the five periods of *infancy*, *childhood*, *youth*, *manhood*, and *old age*. Some writers increase the number of these, unnecessarily, to seven periods, without any practical advantage.

Infancy is the period from birth till the first or milk set of teeth begin to be shed—usually about the seventh year. During this period the body increases in size and stature more, relatively, than at any other period of existence; and the mental faculties undergo great development. The milk-teeth, twenty in number, are evolved in a definite order, beginning with the central incisors at about six months, and ending with the second molars about the termination of the second year. From the size and stature of the body, the development of the teeth, and the more or less advanced state of ossification or solidification of the bony skeleton, conclusions may be drawn as to the probable age of the infant.

Childhood extends from the commencement of the shedding of the milk teeth to the age of puberty—usually from the seventh to the fourteenth or fifteenth year. During this period the body expands, as well as the bony structures, without any clearly marked difference in structure being observable between the sexes except as regards the genitals, so that it is impossible to distinguish absolutely between the male and the female skeleton during this period. The milk-teeth are shed, and are replaced by the second or permanent set, thirty-two in number, though these do not usually all make their appearance during childhood. Marked differences between the proclivities of the sexes are noticeable even at an early period of childhood, and long before the characteristic functions begin to be developed.

Youth is marked at its commencement by the changes which occur at puberty—the development of the genitals in both sexes, the appearance of hair on the genitals, the appearance of a beard in the male, the development of the breasts in the female, the appearance of the monthly flow in the female, and the ability to secrete semen in the male. Marked mental changes now occur, and the generative functions are perfected. Youth terminates at the age of legal majority, twenty-one years; or perhaps the period ought to be extended to twenty-five years of age, as it is with some nations.

Manhood (or *Womanhood*) is the period of perfection of all the bodily and mental powers. It ceases in woman with the cessation of the monthly flow at about forty-five years of age; but in man it generally extends to a much later period of life.

Old Age begins with the decay of the bodily and mental faculties, and is characterized by wrinkling of the skin, loss of the teeth, whitening of the hair, and feebleness of the limbs. In its later stages decay of the mental faculties, deafness, obscurity or loss of vision, and bowing of the spine are added.

2. *Duration of Human Life.*—The chances of human life form an important subject of inquiry, which has been elucidated by the labors of Price, Milne, Farr, and

others; and on deductions from comparisons of birth and death rates is founded the system of annuities, insurance against loss in sickness, and the insurance of lives. Since the establishment of compulsory registration of deaths, our knowledge of the ordinary and extraordinary chances of human life has been much extended, and surer data are now available for calculations of probabilities of life, of survivorships, and of the payments which ought to be made in benefit clubs. (See INSURANCE and LONGEVITY.)

3. *Personal Identity.*—It might be imagined that there is little danger, with the exercise of ordinary care, of mistaking one person for another; but the remarkable case of the Tichborne claimant, and some other less-known but perhaps equally singular instances, have demonstrated that mistakes as to the identity of individuals are easily made, and are more frequent than is commonly supposed. Where the identity has to be established or disproved after long absence, exposure to foreign climates and great hardships, wounds, etc., the problem is often one of extreme difficulty. The data for identifying a person are individual and family likeness, stature, the color of the eyes, peculiarities of garb and manner, recollection of antecedent events, but more especially marks on the person either congenital or acquired. Such are *navi* or mother's marks, scars, and disunited or badly united fractures, known to have existed upon the missing person. An accurate solution of the question is, nevertheless, often a matter of the greatest difficulty.

4. *Marriage.*—Under this head the medical jurist has to deal principally with the nubile age, viewed in the light of nature and according to legislative enactments, and with such physical circumstances as affect the legality of marriages, or justify divorce.

In colder countries the age at which the sexes are first capable of propagating the species is later than in more southern climes. Ordinarily it does not occur before fifteen years of age for the male and fourteen for the female; exceptionally, however, it occurs at the ages of thirteen and of twelve (or even less) respectively in the male and female. By legislative enactment, nevertheless, parents and guardians may forbid the marriage of younger people till the age of legal majority. The only physical circumstances which in the United States form a bar to marriage are physical inability to consummate, and the insanity of one of the parties at the time of marriage. Both those circumstances have been pleaded and sustained in the law courts. In other countries minor physical circumstances, as disease, are held to invalidate marriage.

5. *Impotence and Sterility.*—These may arise from organic or from functional causes—organic impotence being alone irremediable, and as such taken cognizance of by the law courts. On this subject it is unnecessary to enlarge here.

6. *Pregnancy.*—This subject presents one of the widest fields for medico-legal evidence. The limits of age between which it is possible, the limits of utero-gestation, and the signs of pregnancy may all in turn be the subjects of investigation.

The limits of age between which pregnancy is possible are usually fixed by the appearance and cessation of the monthly flow; and these ordinarily begin about fourteen and cease at forty-five years of age. Exceptionally they appear as early as the tenth year, and may not cease till the end of the fifth decade of life. Cases, however, have occurred where a woman has conceived before menstruating; and a few doubtful cases of conception are recorded in women upward of fifty, or even sixty years of age. The general fact of pregnancy being limited by the age of puberty on the one hand and the

cessation of the monthly flow—or fifty years as the extreme limit of age—must be accepted as the safest guide in practice.

The limits of utero-gestation are not in the United States or in England fixed by legislation. The French code fixes the extreme limit of three hundred days. The ordinary period is forty weeks and a half, or two hundred and eighty-three days from the cessation of the last monthly flux. The limit of three hundred days, as fixed by the French code, is perhaps never exceeded, if ever reached. The uncertainty of females in fixing the exact date of conception has given rise to the discrepant opinions of physiologists on the subject. It is well known, however, that among the higher animals the period is not a precise one; and impregnation and conception are doubtless not necessarily coincident.

The signs of pregnancy are of the utmost importance to the medical jurist. He may be called upon to pronounce upon the virtue of a female, to sustain or rebut a plea for divorce, to determine whether a capital sentence shall be carried out, or to determine whether it is probable that an heir will be born to an estate. Should he err in his judgment—and mistakes are very possible in the earlier months of utero-gestation—he may commit a grievous wrong. Medical jurists are in the habit of classifying the signs of pregnancy as uncertain or certain; it is the former which are most regarded by the public, but the latter are alone of probative value to the jurist. The usual and uncertain signs are the cessation of the monthly flow, nausea, sickness, a darkening of the areola and the formation of a secondary areola around the nipple, enlargement of the breasts, increased size of the abdomen, the formation of a tumor in the womb, quickening, and the motions of the fetus. There are also other minor signs of less importance. The certain signs are the uterine souffle, which is a peculiar soft sound heard over the abdomen, and synchronous with the maternal pulse; ballottement, or the examination for a floating tumor in the abdomen between the fifth and eighth months of pregnancy; and the pulsations of the fetal heart, heard by means of the stethoscope. These pulsations are much quicker than, and not synchronous with, the maternal pulse. This is the only indubitable sign of pregnancy. It is inapplicable before the fourth month of gestation.

7. *Parturition*.—The *imminence* of the process of parturition is of comparatively little interest to the medical jurist; but the *signs of recent delivery* are all-important. These signs are the bruised, swollen, and lacerated state of the external genitals, relaxation and dilatation of the vagina and womb, the existence of a peculiar vaginal discharge known as the lochia, a relaxed and fissured condition of the abdominal walls, a peculiar aspect of the countenance, and the distended state of the breasts due to the secretion of milk. The lochial discharge is the most characteristic sign. All the signs may disappear within ten days of delivery, though this is not usual.

Connected with parturition, the question of *viability* of the child is not unimportant. After the intra-uterine age of seven months is reached the child is certainly viable. The period at which the fetus becomes viable cannot be stated with certainty; but five calendar months, or one hundred and fifty days, is perhaps the nearest approximation which can be made. The viability of a child is judged by its size and weight, its general state of development, the state of the skin, hair and nails, its strength or feebleness, the ability to cry, and its power of taking maternal nourishment. The question of viability has important bearing upon the crime of infanticide and the succession of property.

The subject of *superfetation*, or the possibility of

two conceptions having occurred, resulting in the birth of twins with a considerable intervening interval, is a very obscure one, and has given rise to much controversy—its existence being affirmed by some medical jurists, and denied by others. There is much, however, (*e.g.*, the existence of a double or bifid womb) to countenance the view that a double conception is possible.

In the curious case of a man marrying a woman having possession of an estate of inheritance, and by her having issue born alive, and capable of inheriting her estate, the man, on the death of his wife holds her lands for life as a tenant by the “curtesy” of England. Here the meaning of “born alive” is different from the meaning of the same expression as used respecting infanticide. In questions of tenancy by the curtesy it has been decided that any kind of motion of the child, as a twitching and tremulous motion of the lips, is sufficient evidence of live-birth. As regards infanticide, proof of a conclusive separate existence of the child is demanded before live-birth is admitted.

8. *Monsters and Hermaphrodites*.—To destroy any living human birth, however unlike a human creature it may be, is to commit a crime. Blackstone states that a monster which hath not the shape of mankind hath no inheritable blood; but the law has not defined a monster, nor what constitutes a human form. The same author states that if, in spite of deformity, the product of birth has human shape, it may be an heir. Hermaphrodites are beings with malformations of the sexual organs, simulating a double sex. Physiologists do not admit, however, the existence of true hermaphrodites with double perfect organs, capable of performing the functions of both sexes.

9. *Paternity and Affiliation*.—These are often matters of great doubt. A considerable time may elapse between the absence or death of a father and the birth of his reputed child. As has already been said, three hundred days is the utmost limit to which physiologists would extend the period of utero-gestation. This subject involves questions respecting children born during a second marriage of the mother, posthumous children, bastardy, and alleged cases of posthumous children.

10. *Presumption of Survivorship*.—When two or more persons perish by a common accident, when a mother and her new-born child are found dead, and in a few analogous cases, important civil rights may depend upon the question which lived the longest; and great ingenuity has been displayed in elucidating the disputes which have arisen in the law courts in such cases.

11. *Maladies Exempting from Discharge of Public Duties* frequently demand the attention of the medical man. He may be called upon to decide whether a man is able to undertake military or naval service, to act as a juryman without serious risk to life or health, or to attend as a witness at a trial. An endeavor to give a fearless and honest certificate should animate the medical man in the discharge of this delicate duty.

12. *Feigned and Simulated Diseases* often require much skill and acuteness in order to detect the imposture. Where there is reason to suppose that a disease is simulated, much caution as to procedure is also required.

13. *Insanity or Mental Alienation*.—This subject presents an enormous field to the medical jurist. A medical man may be required to give evidence in any of the law courts, civil, criminal, or ecclesiastical, before commissions *de lunatico inquirendo*, or before a magistrate, as to the sanity or insanity of an individual; and he may have to sign certificates of unsoundness of

mind with the view of providing for the safe custody and proper treatment of a lunatic. Hence he must be familiar with the chief forms of insanity (see INSANITY), and be able to distinguish and treat each of these. He will also be required to detect feigned insanity, and to examine persons charged with crime with the view of preventing real lunatics from being treated as criminals.

The terms "unsoundness of mind," applied to the condition of the mind itself, and "*non compos mentis*" to the person whose mind is affected, are legal terms applied to insanity. Lawyers have disputed as to whether imbecility should or should not be included under the head of insanity; but medical men include under this category all disorders or defects of the mind which disqualify a person for managing his affairs, and entering into a binding contract, or which render the individual morally irresponsible for his or her otherwise criminal actions. There is good legal authority for recognizing four forms of unsoundness of mind—*idiocy*, *dementia*, *mania*, and *monomania*.

The chief questions respecting unsoundness of mind which present themselves to the medical jurist are—is the person of sound or unsound mind; if unsound, are there real lucid intervals; is he fit to manage his affairs, to contract a marriage, or to execute a will; is he dangerous to others?

As grounds for restraint, English law recognizes only these conditions—danger to himself, inability to manage his own affairs and property, and danger to the person of others. Before an individual can be placed under restraint in an asylum the certificates of two medical men must be obtained, and the formal order of a relation or friend. The certificates, to be valid, must be signed by legally qualified medical practitioners, having no interest, direct or indirect, in the patient, or in the asylum to which he is to be sent. The medical examiners must pay separate visits, each medical man examining the patient separately. The certificates, which remain valid for seven days only, must bear the exact address of the lunatic, his occupation, and the date of the examination; they must also set forth distinctly the grounds of the opinion they express, under the separate heads of facts observed by the examiner, and facts (to be specified) communicated by others. In the case of pauper lunatics one medical certificate only is required, which is supplemented by an order from a justice of the peace. In urgent cases also one medical certificate suffices for incarceration in an asylum, provided that within three days of the patient's reception two other such certificates are signed by two other medical practitioners, not being connected with the asylum, upon a like examination. The superintendent or proprietor of the asylum must in all cases forward to the commissioners of lunacy a notice of admission within one clear day from the patient's admission. Any infringement of the statutory regulations subjects the person who commits it to a heavy penalty.

II. INJURIES TO THE PERSON.

1. *Defloration*.—The signs of defloration are obscure and uncertain; and it is rather by the coëxistence of several of the usual marks than the existence of any one sign, that any just conclusions can be arrived at.

2. *Rape*.—This crime consists in the carnal knowledge of a woman forcibly and against her will. The resistance must be to the utmost, else the crime of rape has not been committed in the legal sense of the word. The proofs of rape, accordingly, apart from the consistency of the woman's story, mainly depend on the presence of the signs of defloration, and on marks of injury on the man.

3. *Mutilation*.—This may consist in the cutting or maiming of any member; castration is the most important, and perhaps but rarely effected as a crime. Self-mutilation, giving rise to false accusations, is occasionally resorted to.

4. *Criminal Abortion*.—The crime of abortion consists in unlawfully administering to a woman, or causing to be taken by her (whether she be with child or not), with intent to procure her miscarriage, any poison or noxious thing, or using for the same purpose any instrument or other means whatsoever; also in the use of the same means, with the same intent, by any woman being with child.

5. *Homicide*.—The legal sense of the term homicide excludes such injuries as are the result of either accident or suicide. It embraces murder or willful homicide, manslaughter or culpable homicide, casual homicide, and justifiable homicide.

As a preliminary in all cases of homicide, it is the duty of the medical jurist in the first place to ascertain the fact of death, and to distinguish between real and apparent death; and then to determine, if possible, the period at which death took place.

Infanticide or child-murder is by law treated with the same severity as the murder of an adult. Indeed infanticide as a crime distinct from murder has no legal recognition. Practically this severity defeats itself, and offenses which are really cases of child-murder are often treated simply as cases of concealment of birth. The iniquity of the old law which threw the onus of proof of still-birth on the mother now no longer exists, and the law demands strict proof of live-birth at the hands of the prosecution. Hence the subject involves very nice points of forensic medicine. The child must be proved to have arrived at the period when there was a probability of its living (proof of viability); and as the establishment of respiration is necessary to prove live-birth the evidences of this act must be carefully investigated. The size and position of the lungs, and the state of the vessels concerned in fetal circulation, must be carefully noted. The fetal lungs are dark, dense, and liver-like in appearance and consistence, and sink when immersed in water; while the fully respired lungs are rosy, marbled, and soft and crepitant when handled. Minor degrees of respiration are recognized by the appearance of little groups of dilated air-vesicles, and by the fact that, although the lungs as a whole may sink in water, certain portions of them, into which respired air has penetrated, float in water even after subjection to firm pressure in the hand. Care must be taken, nevertheless, to exclude buoyancy of the lung due to putrefaction; in this case the air may be expelled by gentle pressure, and the previously buoyant portion of lung now sinks in water. It is impossible, however, to distinguish certainly between a lung naturally inflated and one artificially insufflated.

It must be borne in mind that, although live-birth cannot be affirmed in the absence of signs of respiration, the presence of these signs is not proof of live-birth in the legal sense of the term. The law demands for live-birth a separate existence of the child after delivery; and breathing may take place while the child is still either wholly or partially within the maternal passages, and in some special cases while still within the womb itself.

When proofs of respiration—it may be to such an extent as to leave no doubt as to live-birth—have been found, the cause of death is then to be investigated. Wounds, and other forms of injury, must be sought for. There may be signs of strangulation, suffocation, puncture of the fontanelles, and consequent injury to the brain, the administration of a poison, or other means of

procuring death. It must be borne in mind that some of these causes may be brought about by omission, or even by accident. Thus strangulation may arise from natural and unrelieved pressure of the navel string on the neck of the child; suffocation from immersion of the face of the child in the maternal discharges, or by pressure of clothes on the mouth. Death may result from hæmorrhage through neglect to tie the navel string, or the infant may perish from exposure to cold.

In the case of exposed infants it is very important to ascertain the real mother. As such exposure usually takes place soon after birth, comparison of the age of the infant with the signs of recent delivery in the suspected mother is the best method of proving the relation.

Ordinary *homicide* may be accomplished by several modes that may sometimes be ascertained by examination of the body. Of one of the most important of these consideration is deferred to the article POISONS.

Death by *asphyxia* is a common mode of accomplishing homicide, as by suffocation, drowning, hanging, strangulation, or by exposure to mephitic air. Suicide and accidental death from these causes are still more common. (1) *Drowning* is thought to produce death occasionally by the suddenness of the shock causing suspension of the functions of circulation and respiration—by shock without a struggle. The usual mode of death appears, however, to be by the circulation of un-oxygenated blood through the brain acting as a poison upon that organ; and this is attended with all the phenomena of asphyxia, as in suffocation. The phenomena attending asphyxia are as follows:—As soon as the oxygen in the arterial blood, through exclusion of air, sinks below the normal, the respiratory movements grow deeper and at the same time more frequent; both the inspiratory and expiratory phases are exaggerated, the supplementary respiratory muscles are brought into play, and the breathing becomes hurried. As the blood becomes more and more venous, the respiratory movements continue to increase in both force and frequency. Very soon the expiratory movements become more marked than the inspiratory, and every muscle which can in any way assist in expiration is brought into play. The orderly expiratory movements culminate in expiratory convulsions; these violent efforts speedily exhaust the nervous system, and the convulsions suddenly cease and are followed by a period of calm. The calm is one of exhaustion; all expiratory active movements have ceased, and all the muscles of the body are flaccid and quiet. But at long intervals lengthened, deep inspiratory movements take place; then these movements become less frequent; the rhythm becomes irregular, so that each breath becomes a more and more prolonged gasp, which becomes at last a convulsive stretching of the whole body; and with extended limbs and a straightened trunk, with the head thrown back, the mouth widely open, the face drawn, and the nostrils dilated, the last breath is taken. The above phenomena are not all observed except in cases of sudden and entire exclusion of air from the lungs. In slow asphyxia, where the supply of air is gradually diminished (*e.g.*, in drowning), the phenomena are fundamentally the same, but with minor differences. The appearances of the body after death from drowning are various. There may be pallor of the countenance, or this may be livid and swollen. The air passages are filled with frothy mucus, and there may be water in the stomach. The ends of the fingers are often excoriated from grasping at objects; and weeds, etc., are sometimes found grasped in the hands. The distinction between murder and suicide by drowning can rarely be made out by examination of the body alone, and is usually decided from collateral circumstances or marks of a struggle. At-

tention must also be paid to the existence of wounds on the body, marks of strangulation on the neck, and the like. (2) *Hanging* may result in death from asphyxia, or, as is more particularly the case in judicial hanging, some injury is inflicted on the upper portion of the spinal cord, resulting in instant death. The ordinary appearances of death from asphyxia may be found: dark fluid blood, congestion of the brain, intensely congested lungs, the right cavities of the heart full, and the left comparatively empty of blood, and general engorgement of the viscera. Ecchymosis may be found beneath the site of the cord, or a mere parchmenty appearance. There may even be no mark of the cord visible. The mark, when present, usually follows an oblique course, and is high up the neck. The fact that a body may be suspended after death, and that if this be done speedily while the body is still warm there may be a *post-mortem* mark undistinguishable from the mark observed in death from hanging, must not be forgotten. (3) *Suffocation* may occur from the impaction of any substance in the glottis, or by covering up the mouth and nose. It is frequently of accidental origin, as when substances become accidentally impacted in the throat, and when infants are overlaid. The phenomena are those of pure asphyxia, which have already been detailed. On *post-mortem* examination the surface of the lungs is found covered with minute extravasations of blood, known as punctuated ecchymosis. (4) *Strangulation* may be accomplished by drawing a cord tightly around the neck, or by forcibly compressing the windpipe (throttling). Hence there may be either a circular mark around the neck, not so oblique as after hanging, or the marks of the fingers may be found about the region of the larynx. The cartilaginous structure of the larynx and windpipe may be broken. The mark of the ligature is often low down in the neck. The signs of asphyxia are present in a marked degree. (5) *Mephitism*.—Death from the inhalation of irrespirable gases is a mode of assassination seldom employed, but is frequently resorted to on the Continent by suicides, charcoal fumes being commonly used for the purpose (see POISONS).

6. *Death from Starvation*.—Cases occur in which it is important to distinguish this from other modes of death. In such cases the skin becomes harsh and dry, and may acquire a peculiar odor; the subcutaneous fat disappears; the gums shrink away from the teeth; the tongue and mouth become dark-colored and dry; the eyes are bloodshot; the intestines become thin and their coats translucent; the gall-bladder is distended. The period of total abstinence from food required to kill an adult is unknown, and greatly depends upon whether there be access to liquid. In some cases persons have been able to subsist on little or no nourishment for long periods, the body being in a state of quasi-hibernation.

7. *Death from Extremes of Temperature*.—(1) Death from cold is not often observed. A portion only of the body, as the extremity of a limb, may perish from extreme cold. After the first sensation of tingling experienced on exposure to severe cold, loss of sensation supervenes, with languor and an irresistible propensity to sleep. The tendency to this forms an extreme danger in such cases. (2) Death from extreme heat usually occurs in the form of burning and scalding, attended with destruction of a large portion of the cutaneous structures. Here the cause of death is obvious. The human body is capable of exposure to very hot air—as is seen in Turkish baths—for a considerable period with impunity. Sun-stroke is a cerebral affection brought on by too great exposure to a hot atmosphere, especially while undergoing fatigue.

8. *Death by Lightning.*—Lightning or an artificial electric current may cause instant death. No visible marks of the effects of the electric current may be left, or the body may be singed or discolored, or the skin may be perforated at one or two spots.

9. *Wounds.*—The examination of wounds, whether fatal or not, often becomes an important branch of forensic medicine. Wounds are usually divided into *contused, lacerated, incised, punctured, and gunshot* wounds. For poisoned wounds see POISONS. Each kind of wound requires to be minutely examined and described, as they are in approved works on surgery. The degree of danger from each should be familiar to the medical jurist; and he should recollect that there is no wound which may not become incidentally fatal from improper treatment, peculiarities of constitution, or accidental inoculation with septic material. Punctured wounds or stabs require minute attention; for there have been instances in which death has been produced by an instrument so small as a pin thrust into a vital part. *Wounds of the head* are always dangerous, especially if the blow has been severe. The person so wounded may die without division of the skin, or fracture of the bones, as happens in what is known as *concussion* of the brain. Contusions which do not divide the skin may fracture the skull; or the inner table of the skull may be fractured without the outer being broken or depressed. Even wounds of the scalp may prove fatal, from inflammation extending toward the brain. Punctured wounds of the head are more dangerous than cuts, as more likely to excite fatal inflammation. When the brain and its membranes are injured, all such wounds are generally fatal. Wounds of the face or organs of sense are often dangerous, always disfiguring, and productive of serious inconvenience. *Wounds of the neck* are always very serious wherever more than the skin is divided. The danger of opening large blood-vessels, or wounding important nerves, is imminent; even the division of a large vein in the neck has proved immediately fatal, from the entrance of air into the vessel, and its speedy conveyance to the heart. A blow on the neck has instantly proved fatal, from injury to an important nerve, generally the pneumogastric or the sympathetic. Dislocations and fractures of the bones of the neck prove instantly fatal. *Wounds of the chest* are always serious when the cavity is penetrated, though persons may recover from wounds of the lungs, and have even survived for some time considerable wounds of the heart. This last is an important fact; because we are not always to consider the spot where the body of a person killed by a wound of the heart, and apparently remaining where he fell, is found as that in which the fatal wound was inflicted. Instances have occurred of persons surviving severe wounds of the heart for several days. Broken ribs are never without danger; and the same may be said of severe contusions of the chest, from the chance of inflammation extending inward. Wounds penetrating both sides of the chest are generally considered as fatal; but possibly there may be recovery from such. *Wounds of the abdomen*, when they do not completely penetrate, may be considered as simple wounds, unless when inflicted with great force, so as to bruise the contents of the abdominal cavity; in that case they may produce death without breach of surface, from rupture of some viscus, as sometimes happens from blows or kicks upon the belly. Wounds injuring the peritoneum are highly perilous, from the risk of severe inflammation. Wounds of the stomach or intestines, or of the gall-bladder, generally prove mortal, from the effusion of their contents into the peritoneal cavity producing fatal inflammation. Wounds of the liver, spleen, or kidneys are generally soon mortal,

from the great vascularity of those organs. Wounds of the extremities, when fatal, may generally be considered so from excessive hemorrhage, from the consequences of inflammation and gangrene, or from the shock to the system when large portions of the limb are forcibly removed, as in accidents from machinery, and in wounds from firearms.

10. *Poisonous Food.*—Under certain conditions, various articles of diet, especially butcher meat, eggs, milk, butter, cheese, and honey, may become possessed of poisonous properties, and this may arise from a variety of causes besides the introduction of known and specific poisons. Moreover, certain kinds of animal food—fish chiefly—may have definite toxic properties. Food may be more or less poisonous—(1) from unsoundness, either from putridity or decomposition or disease; (2) from the presence of parasites; (3) from moldiness, or presence of deleterious microscopic fungi; and (4) where the flesh is that of animals which have fed on noxious plants—and under this head may also be classed poisonous honey, which bees have gathered from poisonous plants. (5) It may be of the nature of poisonous fish, using the term fish in the popular sense. (6) Certain fungi or mushrooms are poisonous. Parasitic diseases would, strictly speaking, come under the first head; but the preventive measures to be adopted in the use of food infested with parasites will alone be treated of in this place.

(1) *Poisonous Vegetables.*—Unsound or even rotten vegetables and fruits may be consumed, and become fertile sources of varied forms of poisoning, especially in hot summers. The symptoms produced by the ingestion of large quantities of unsound fruit or vegetables are of a diarrhoeal character, not often of an alarming severity, except in the case of the young and feeble. They may, however, sometimes attain a fatal severity. The cause is usually obvious, and the treatment is simple; mild purgatives, as rhubarb or castor oil, with or followed by opiates, to remove peccant matters from the intestines; and stimulants, as ammonia or alcohol, if there be much collapse. Certain fungi or mushrooms are known to be specially poisonous, such as the *Amanita muscaria*, or fly-fungus, and others. Certain kinds of mushrooms, usually innocuous, are occasionally poisonous or deleterious; and the cause of it is not always clear. Poisonous fungi produce narcotic and irritant symptoms.

(2) *Poisonous, Tainted, or Putrid Meat.*—The obvious characteristics of good sound flesh meat are that its color is red—neither pale pink nor deep purple; that it is marbled in appearance; firm and elastic to the touch, scarcely moistening the fingers; having a slight and not unpleasant odor; and that when exposed to the air for a day or two it should neither become dry on the surface nor wet and sodden. Sound meat is acid to litmus paper; unsound meat may be neutral or alkaline. Meat may be tainted with physic administered to the animal. It is a common practice, when a fat and valuable animal is unwell, to physic it, and if its recovery be not speedy to slaughter it. The meat of such animals may often be met with in our markets, and may induce illness from the physic with which it is contaminated. The effects of simple putridity are most varied. It is well known that some nations habitually eat putrid meat, and even prefer it to fresh; and the development of rottenness in eggs for the epicure is an art in China. There is no doubt that habit has much to do with the tolerance by the stomach of putrid meat, whether cooked or uncooked. But tainted game, and indeed all kinds of meat in which putrefaction has commenced, may indubitably produce disease. This is chiefly of a diarrhoeal character, preceded by rigors, and attended with col-

lapse, and, it may be, convulsions and other signs of a profound affection of the nervous system. The effects of such tainted meat are slight as compared with those which are produced by the sausage-poison, developed by a sort of modified putrefaction in certain German sausages. These sausages, when they become musty and soft in their interior, nauseous in odor and flavor, and strongly acid to test paper, acquire a highly poisonous character, and are frequently fatal in their effects. The symptoms produced by the use of poisonous flesh are gastric pain, vomiting, diarrhoea, depression, coldness of the limbs, and weak, irregular action of the heart. Fatal cases end in convulsions and oppressed respiration, death ensuing from the third to the eighth day. The nature of the sausage-poison, which is probably akin to that of putrid and indeed all non-specifically tainted meats, has been a matter of considerable controversy. Some have held that the poisonous action is due to the development of rancid fatty acids; others believe that a so-called catalytic body is produced, capable of setting up by contact a similar catalytic action. Others have regarded the sausage-poison as due to the formation of pyrogenous acids during the drying or smoking of the sausages. The recent discovery by Selmi of a class of poisonous alkaloids or amides, termed *ptomaines*, developed during putrefaction of animal matters, on the one hand, and the discovery by Ballard and Klein, still more recently, that the fatally poisonous properties of hams prepared according to the American method may be due to the presence of a parasitic bacillus, point to one or other of these two latter causes as that of the effects of sausage-poison. Others again have referred the effects to the presence of a microscopic fungus—*Sarcina botulinæ*.

The poisonous nature of the flesh of animals which have fed on certain plants—for example, hares which have fed on certain species of rhododendron, pheasants on the kalmia shrub, etc.—has been abundantly demonstrated, and need only be referred to here. The honey from bees which have garnered on poisonous plants, as the azalea, may likewise be deleterious; and the fact is of classic interest. The milk even of goats which have browsed on poisonous herbs has also proved poisonous.

(3) *Diseased Meat*.—The poisonous effects of meat affected with certain parasites—trichinæ, cysticerci, trematodes, etc., is an undoubted fact. Great quantities of meat pass through our markets which is undoubtedly the flesh of animals affected with disease, such as foot-and-mouth disease, pleuro-pneumonia, pig typhoid, the so-called scarlatina of swine, sheep-pox, etc.; and the question is quite undecided as to whether such flesh produces any injurious effects. To stop the sale of such meat would be to cut off large sources of our meat supplies. The evils attending the use of such diseased meat, when well cooked, have undoubtedly been exaggerated; but, on the other hand, there is enough evidence to show that the use of certain kinds of diseased meat may be followed by serious results. Thus it is generally admitted that the flesh of animals which have suffered from pleuro-pneumonia and murrain will give rise to boils and carbuncles. Braxy mutton may also produce disease when eaten. Trichinæ will produce trichinosis, flukes, the tapeworm, etc. Hams are occasionally fatally poisonous; and this has been traced to the presence of certain low organisms known as *bacilli*.

(4) *Poisonous Fish*.—Fish is sometimes a poisonous article of food. Cases of poisoning by the so-called shell-fish of the British Islands are not infrequently met with. Generally it is the eating of crabs, lobsters, and mussels which produces such results. These are usually of a distressing rather than of a serious character, nettle-rash being a common symptom. Occasionally, how-

ever, fatal results have ensued from the use of mussels. In tropical seas poisonous fish are more plentiful—the golden sardine, the bladder fish, the gray snapper, etc.; and, these being eaten by larger fish, as the barracuda, perch, globe-fish, conger eel, etc., the latter may in turn become poisonous.

Good cookery, that is, exposure to a sufficiently high temperature for a sufficiently lengthened time, is undoubtedly the best measure to adopt short of absolute destruction of unsound and diseased meat. So long as meat is high-priced, and the effects of diseased meats so little understood and so undefined, it will be impossible to induce medical officers or health and sanitary inspectors to seize all the diseased and unsound meat which is daily offered for sale. Notwithstanding all that has been said to the contrary, experienced observers are pretty well agreed that thorough exposure of the meat throughout to the temperature at which albumen is coagulated is destructive to the parasites of flesh. Smoking is less effective. Salting is more effective than smoking; but there is some evidence to show that salting may merely hold the life of organisms in suspense without entirely destroying their vitality; and thus in the conversion of salted pork into hams—a process of re-salting and subsequent drying—the specific germ (a bacillus) has been known to be again rendered harmful. It is not known whether efficient cooking entirely removes the deleterious effects of flesh affected with other than parasitic disease, as for example pleuro-pneumonia.

The curative measures for the results of eating poisonous food cannot be specially described. They are those which must be arrived at on general principles. Symptoms are to be treated, and the powers of the patient sustained until the deleterious matter is removed by the ordinary channels, or the trichinæ have become encysted.

HISTORY OF FORENSIC MEDICINE.

In regard to the means and appliances used for the detection of crime, the microscope and spectroscope have of late years taken the front rank. So important indeed has the microscope become that the science of MICROSCOPY (*q.v.*) may be said to be the most efficient adjunct of medical jurisprudence. Medical jurisprudence, as a science, dates only from the sixteenth century.

At the close of the sixteenth century Ambrose Paré wrote on monsters, on simulated diseases, and on the art of drawing up medico-legal reports; Pineau also published his treatise on virginity and defloration. About the same time as these stimuli to the study of forensic medicine were being made known in Paris, the first systematic treatise on the science appeared in Sicily in the form of a treatise *De Relationibus Medicorum* by Fidele. Paulo Zacchia, the illustrious Roman medical jurist, moreover published from 1621 to 1635 a work entitled *Quæstiones Medico-Legales*, which marks a new era in the history of the science—a work which displays an immense amount of learning and sagacity in an age when chemistry was in its infancy, and physiology very imperfectly understood. The discovery of the circulation of the blood by Harvey soon followed, and gave a new impetus to the study of those branches of forensic medicine having direct relations to physiology; and to Harvey we owe the idea how to apply Galen's observations on the differences between the fetal and the adult lungs to the elucidation of cases of supposed infanticide. About this time, too, Sebiz published two treatises on the signs of virginity and on the examination of wounds respectively. In the former he contended that the hymen was the real mark of virginity; but this was denied by Augenio and Gassendi. In 1663 Bartholin, a

Danish physician, investigated the period of human uterine gestation, a subject which had engaged the attention of Aristotle. He also proposed the "hydrostatic test" for the determination of live-birth—a test still in use, and applied by observing whether the lungs of an infant float or sink in water. Swammerdam explained the rationale of the process in 1677; but it was not till 1682 that it was first practically applied by Jan Schreyer.

Germany, ever the leader in questions of forensic medicine, introduced the first public lectures on medical jurisprudence.

Professorships for teaching the subject were founded in the German universities early in the eighteenth century, and numerous treatises on forensic medicine were published.

In the present century France took the lead; and the institution of three professorships of forensic medicine at the end of the eighteenth century produced excellent fruits.

Though forensic medicine may be said to have been entirely neglected in England till the beginning of the present century, its progress has since been by no means slow or unimportant; and the subject now forms a recognized and obligatory method of study.

America, too, has not been behindhand in the race. Wharton and Stillé's *Manual* and Wormley's *Toxicology* are the best-known works of American authors.

MEDICI. This family is renowned in Italian history for the extraordinary number of statesmen to whom it gave birth, and for its magnificent patronage of letters and art. It emerged from private life and rose to power by means of a very subtle policy that was persistently pursued from generation to generation. The origin of the family is buried in obscurity. Some court historians indeed declare it to have been founded by Perseus, and assert that Benvenuto Cellini's bronze Perseus holding on high the head of Medusa was executed and placed in the Loggia dei Lanzi to symbolize the victory of the Medici over the republic. But this only proves that the real origin of the family is unknown, and equally unknown is the precise signification of the Medicean arms—six red balls on a field of gold.

The name appears in Florentine chronicles as early as the close of the twelfth century, although only casually mentioned in connection with various offices of the republic. The first of the family to be a distinct figure in history was Salvestro dei Medici, who, in the year 1378, took an active part in the revolt of the Ciompi.

On Salvestro's death in 1388 the Albizzi repossessed themselves of the government, and conducted the wars of the republic. Vieri dei Medici, who seems to have been the next head of the family, understanding the temper of the times, abstained from becoming a popular leader, and left it to his successors to prosecute the task under easier conditions. Then in the person of Giovanni, son of Bicci dei Medici (1360–1429), another branch of the family arose, and became from that time forward its representative branch. Indeed this Giovanni may be considered the actual founder of Medicean greatness. He took little part in political affairs, but realized an immense fortune by trade—establishing banks in Italy and abroad, which in his successors' hands became the most efficient engines of political power. The council of Constance (1414–1418) enabled Giovanni dei Medici to realize enormous profits. He died in 1429, leaving two sons, Cosimo (1389–1464) and Lorenzo (1395–1440). From the former proceeded the branch that held absolute sway for many generations over the nominal republic of Florence, and gave to Italy popes like Leo X. and Clement VII. On the extinction of this elder line in the sixteenth century, the younger branch, derived from Lorenzo, Cosimo's brother, seemed to acquire new life,

and for two centuries supplied grand-dukes to Tuscany. Cosimo, surnamed Cosimo the Elder, to distinguish him from the many others bearing the same name, and honored after his death by the title of *Pater Patriæ*, first succeeded in solving the strange problem of becoming absolute ruler of a republic that was keenly jealous of its liberty, without holding any fixed office, without suppressing any previous form of government, and always preserving the appearance and demeanor of a private citizen. On August 1, 1464, Cosimo breathed his last, at the age of seventy-five, while engaged in listening to one of Plato's dialogues.

The lordship of Florence passed into the hands of Piero, surnamed the Gouty, Cosimo's only surviving legitimate son. Piero died at the end of five years' reign, December 3, 1469, leaving two sons, Lorenzo (1449–92) and Giuliano (1453–78). The younger, the gentler, and less ambitious of the pair was, as we shall presently see, quickly removed from the world. Lorenzo, on the contrary, at once seized the reins of state with a firm grasp, and was, chronologically, the second of the great men bestowed upon Italy by the house of Medici. At his father's death he was only twenty-one years old, but instantly showed his determination to govern Florence with greater despotism than his father or grandfather.

On April 26, 1478, while Giuliano and Lorenzo were attending high mass in the cathedral of Florence, the former was mortally stabbed by conspirators, but the latter was able to beat back his assailants and escape into the sacristy. His life saved, and no longer having to share the government with a brother, Lorenzo profited by the opportunity to wreak cruel vengeance upon his foes. Several of the Pazzi and their followers were hanged from the palace windows; others were hacked to pieces, dragged through the streets, and cast into the Arno, while a great many more were condemned to death or sent into exile. Lorenzo seemed willing and able to become a tyrant. But he stopped short of this point. His palace was the school and resort of illustrious men. He was an elegant prose writer, and was likewise a poet of real originality. At that period Italians were forsaking erudition in order to forward the revival of the national literature by recurring to the primitive sources of the spoken tongue and popular verse. It is Lorenzo's lasting glory to have been the initiator of this movement. Without being—as some have maintained—a poet of genius, he was certainly a writer of much finish and eloquence, and one of the first to raise popular poetry to the dignity of art.

Lorenzo left three sons—Pietro (1471–1503), Giovanni (1475–1521), and Giuliano (1479–1516). He was succeeded by Pietro, whose rule lasted but for two years.

The ensuing period was adverse to the Medici, for a republican government was maintained in Florence from 1494 to 1512, and the city remained faithful to its alliance with the French, who were all-powerful in Italy. Cardinal Giovanni, the head of the family, resided in Rome. Pietro had now been dead for some time, leaving a young son, Lorenzo (1492–1519), who was afterward duke of Urbino. The following year (1513) Cardinal Giovanni was elected pope, and assumed the name of Leo X.

Leo X., who is only indirectly connected with the history of Florence, gave his name to the age in which he lived in consequence of his magnificent patronage of art and letters in Rome. But he was merely a clever amateur, and had not the literary gifts of his father Lorenzo. Giuliano dei Medici had died during Leo's reign, in 1516, without having ever done anything worthy of record. Lorenzo, being of more ambitious temper, was by no means content to remain at the

head of the government of Florence hampered by many restrictions imposed by republican institutions, and subject to the incessant control of the pope. By his marriage with Madeleine de la Tour d'Auvergne, he had one daughter, Caterina dei Medici (1519-89), married, in 1533, to Henry, duke of Orleans, afterward king of France. She played a long and sinister part in the history of that country. Lorenzo also left a natural son named Alessandro, inheriting the frizzled hair and projecting lips of the negro or mulatto slave who had given him birth. His miserable death will be presently related. Thus the only three surviving representatives of the chief branch of the Medici, Cardinal Giulio, Ippolito, and Alessandro, were all of illegitimate birth, and left no legitimate heirs.

Cardinal Giulio, who had labored successfully for the reinstatement of his family in Florence in 1512, had been long attached to the person of Leo X. as his trusted factotum and companion. He had been generally regarded as the mentor of the pope, who had no liking for hard work. But in fact, his frivolity notwithstanding, Leo X. always followed his own inclinations. He had much aptitude for command, and pursued his shuffling policy without any mental anxiety. Giulio, on the contrary, shrank from all responsibility, muddled his brains in weighing the reasons for and against every possible decision, and was therefore a better tool of government in others' hands than he was fit to govern on his own account. When Giuliano and Lorenzo died, the pope appointed the cardinal to the government of Florence. In that post, restricted within the limits imposed by republican institutions, and acting under the continual direction of Rome, he performed his duties fairly well. He caressed the citizens with hopes of extended liberties, which, although never destined to be fulfilled, long served to keep men's minds in a pleasant flutter of expectation; and when the more impatient spirits attempted to raise a rebellion he speedily quenched it in blood. When, after the death of Leo X. and the very brief pontificate of Adrian VI., he was elected pope (1523) under the name of Clement VII., he intrusted the government of Florence to Cardinal Silvio Passerini conjointly with Alessandro and Ippolito, who were still too young to do much on their own account.

The question of the moment was the transformation of the old republican régime into a principedom; as an unavoidable result of this change it followed that Florence was no longer to be the ruling city to whose inhabitants alone belonged the monopoly of political office. When the leading Florentine families realized, not only that the republic was destroyed, but that they were reduced to equality with those whom they had hitherto regarded as their inferiors and subjects, their rage was indescribable, and hardly a day passed without the departure of influential citizens who were resolved to achieve the overthrow of their new ruler. They found a leader in Cardinal Ippolito dei Medici, who was then in Rome, embittered by the preference given to Alessandro, and anxious to become his successor with the least possible delay. Under the pressure of terror the duke at once became a tyrant. He garrisoned the different cities, and began the erection in Florence of the Fortezza da Basso, built chiefly at the expense of Filippo Strozzi, who afterward met his death within its walls.

In 1534 Clement VII. died, and the election fell on Paul III., from whom Cardinal Ippolito hoped to obtain assistance for his designs. Accordingly the principal Florentine exiles were dispatched on a mission to the emperor Charles V., with complaints of Alessandro's tyranny and his shameless violation of the terms upon which the city had surrendered. Duke

Alessandro, being cited to appear, came to Naples accompanied by Francesco Guicciardini, who by speaking in his defense rendered himself odious to all friends of liberty, and irretrievably tarnished his illustrious name. On this account, and perhaps to some extent through the emperor's personal liking for the duke, the latter rose higher than before in the imperial favor, married Margaret of Austria, the natural daughter of Charles, and returned to Florence with increased power. He was murdered by his cousin in 1537. By Alessandro's death the elder branch of the Medici became extinct, and thus the appearance of the younger line was heralded by a bloody crime.

Guicciardini, Vettori, and others of the leading citizens favored the choice of Cosimo, the son of Giovanni delle Bande Nere, for his successor. He was already in Florence, was aged seventeen, was keen-witted and aspiring, strong and handsome in person, heir to the enormous wealth of the Medici, and, by the terms of the imperial patent, was Alessandro's lawful successor. Charles V. approved the nomination of Cosimo, who without delay seized the reins of government with a firm grasp. Like Alessandro, he was named head of the republic; and Guicciardini and others who had worked hardest in his cause hoped to direct him and keep him under their control. But Cosimo soon undeceived them by proving that, his youth notwithstanding, he had a will of his own, and was resolved to rule unshackled by republican forms and unhampered by advisers disposed to act as mentors. The Florentines had now an absolute prince who was likewise a statesman of eminent ability.

In 1539 he espoused Eleonora of Toledo, daughter of the viceroy of Naples, by whom he had several children. Two died in 1562, and their mother soon followed them to the grave. It was said that one of these boys, Don Garcia, had murdered the other, and then been killed by the enraged father. Indeed Cosimo was further accused of having put his own wife to death; but neither rumor had any foundation. He now showed signs of illness and failure of strength. He was not old, but worn by the cares of state and self-indulgence. Accordingly in 1564 he resigned the government to his eldest son, who was to act as his lieutenant, since he wished to remain the virtual head of the state and have power to resume the scepter on any emergency. In 1570, by the advice of Pius V., he married Camilla Martelli, a young lady of whom he had been long enamored. In 1574 he died, at the age of fifty-four years and ten months, after a reign of thirty-seven years, leaving three sons and one daughter besides natural children. These sons were Francesco, his successor, who was already at the head of the government, Cardinal Ferdinand, and Piero.

Francesco I., born in 1541, began to govern as his father's lieutenant in 1564, and was married in 1565 to the archduchess Giovanna, of Austria. On beginning to reign on his own account in 1574, he speedily manifested his real character. Francesco was a slave to his passions, and was led by them to scandalous excesses and deeds of bloodshed. His example and neglect of the affairs of the state soon caused a vast increase of crime even among the people, and, during the first eighteen months of his reign, there occurred no less than one hundred and sixty-eight murders. On October 18, 1587, the grand-duke died at his villa of Poggio a Caiano.

Ferdinand I. was thirty-eight years of age when, in 1587, he succeeded his brother on the throne. He was in all respects his brother's opposite. Affable in his manners and generous with his purse, he chose a crest typical of the proposed mildness of his rule—a swarm

of bees with the motto *Majestate tantum*. He instantly pardoned all who had opposed him, and left his kinsmen at liberty to choose their own place of residence. Occasionally, for political reasons, he committed acts unworthy of his character; but he reestablished the administration of justice, and sedulously attended to the business of the state and the welfare of his subjects.

Ferdinand I. died in 1609, leaving four sons, of whom the eldest, Cosimo II., succeeded to the throne at the age of nineteen. He was at first assisted in the government by his mother and a council of regency. He had a good disposition, and the fortune to reign during a period when Europe was at peace and Tuscany blessed with abundant harvests.

Like his predecessors, Cosimo II. studied to promote the prosperity of Leghorn, and he deserves honor for abandoning all commerce on his own account. The best deed done by Cosimo II. was the protection accorded by him to Galileo Galilei, who had removed to Padua, and there made some of his grandest discoveries. The grand-duke recalled him to Florence in 1610, and nominated him court mathematician and philosopher. Cosimo died in February, 1621, after twelve years of a quiet reign marked by no great event.

In 1627 Ferdinand II., then aged seventeen, assumed the reins of government; but, being of a very gentle disposition, he decided on sharing his power with the regents and his brothers, and arranged matters in such wise that each was almost independent of the other. He gained the love of his subjects by his great goodness; and, when Florence and Tuscany were cruelly ravaged by the plague in 1630, he showed admirable courage, and carried out many useful measures. But he was totally incapable of energy as a statesman.

Cosimo III. succeeded his father (Ferdinand) in 1670. He was weak, vain, bigoted, and hypocritical. Cosimo's hypocritical zeal for religion compelled his subjects to multiply services and processions, that greatly infringed upon their working hours. He wasted enormous sums in pensioning converts—even those from other countries—and in giving rich endowments to sanctuaries. Meanwhile funds often failed for the payment of government clerks and soldiers.

Cosimo's dominant anxiety regarded the succession to the throne. His eldest son, Ferdinand, died childless in 1713. The pleasure-loving Giovan Gastone was married to Anna Maria of Saxe-Lauenburg, widow of a German prince, a wealthy, coarse woman wholly immersed in domestic occupations, and who seemed little likely to give birth to any children. After living with her for some time in a Bohemian village, Giovan Gastone yielded to his dislike to his wife and her country, withdrew to France, and ruined his health by excesses. After a brief return to Bohemia he finally separated from his wife, by whom he had no family. Thus the dynasty was doomed to extinction. Cosimo had a passing idea of reconstituting the Florentine republic, but, this design being discountenanced by the European powers, he determined to transfer the succession, after the death of Giovan Gastone, to his sister, Anna Maria Louisa, who in fact survived him. For this purpose he proposed to annul the patent of Charles V., but the powers objected to this arrangement also, and by the treaty of 1718 the quadruple alliance of Germany, France, England, and Holland decided that Parma and Tuscany should descend to the Spanish Infante, Don Carlos. The grand-duke made energetic but fruitless protest.

Cosimo III. had passed his eightieth year at the time of his decease in October, 1723, and was succeeded by his son Giovan Gastone, then aged fifty-three. The new sovereign was in bad health, worn out by dissipa-

tion, and had neither ambition nor aptitude for rule. He wished to live and let live, and liked the people to be amused. Everything in fact bore a freer and gayer aspect under his reign, and the Tuscans seemed to feel renewed attachment for the dynasty as the moment of its extinction drew near. But the grand-duke was too feeble and incapable to accomplish any real improvement. Surrounded by gay and dissipated young men, he intrusted all the cares of government to a certain Giuliano Dami, who drove a profitable trade by the sale of offices and privileges. In this way all things were in the hands of corrupt individuals; while the grand-duke, compelled to pass the greater part of his time in bed, vainly sought diversion in the company of buffoons, and was only tormented by perceiving that all the world disposed of his throne without even asking his advice. And when, after prolonged opposition, he had resigned himself to accept Don Carlos as his successor, the latter led a Spanish army to the conquest of Naples, an event afterward leading to the peace of 1735, by which the Tuscan succession was transferred to Francesco II., duke of Lorraine, and husband of Maria Theresa. Giovan Gastone was finally obliged to submit even to this. Spain withdrew her garrison from Tuscany, and Austrian soldiers took their place and swore fealty to the grand-duke on February 5, 1737. He expired on July 9th of the same year. Such was the end of the younger branch of the Medici, which had found Tuscany a prosperous country, where art, letters, commerce, industry, and agriculture flourished, and left her poor and decayed in all ways, drained by taxation, and oppressed by laws contrary to every principle of sound economy, downtrodden by the clergy, and burdened by a weak and vicious aristocracy.

MEDICINE, the subject-matter of one of the learned professions, includes, as it now stands, a wide range of scientific knowledge and practical skill. The science of medicine is the theory of diseases and of remedies. While the notion of disease is necessarily or inevitably correlated with the notion of health, there is no necessary and invariable relation, but, on the other hand, a merely conventional association, between a disease and a remedy. That part of the science of medicine which corresponds to the theory of remedies is not, therefore, in a position scientifically inferior to the theory of diseases; for each article of the materia medica—apart from a few inert substances—has a certain effect on the organism in health and in disease, which is ascertainable with scientific precision. Those properties and actions of drugs are the subject of pharmacology and toxicology; the circumstances under which the several articles of the materia medica become remedial are the subject of therapeutics, and therapeutics is dependent for its scientific position upon the completeness of the theory of diseases, or pathology.

Disease is the correlative of health, and the word is not capable of a more penetrating definition. From the time of Galen, however, it has been usual to speak of the life of the body either as proceeding in accordance with nature, or as overstepping the bounds of nature. Taking disease to be a deflection from the line of health, the first requisite of medicine is an extensive and intimate acquaintance with the norm of the body. The normal condition of the body is capable of being determined without ambiguity; it is the absence from its structure and functions of every disease hitherto known. The structure and functions of the body form the subject of anatomy and physiology.

Physiology is, strictly speaking, the science of that which is in accordance with nature, and it is usual to say that the theory of diseases is based upon physiology. But, although all that was implied in the Hip-

pocratic term *natura* may be claimed as the subject-matter of physiology, yet, in the ordinary connotation of the term, physiology divides the empire with anatomy. To physiology the functions of the body are usually assigned, and to anatomy its form and structure. But, as a matter of fact, the structures and functions of the organism are not separable; structure is correlated to function, whether active, dormant, or extinguished, and in like manner function is the twin notion of structure. In the ultimate analysis neither term means anything without the other, and both together mean life. It is owing mostly to its name that physiology is supposed to have a preponderant interest for the theory of disease; the word anatomy is not well adapted to carry its own half of the structure-and-function dualism. Both in the historical development and in the logical connotation, anatomy is as much associated with the living and moving body as physiology itself; but its etymology has always been against it, and it has become more and more difficult to retain for anatomy anything beyond the technicalities of the dissecting-room. The subject of general anatomy has for the most part disappeared from modern textbooks, its place being taken by histology, which deals with the minute structure of the simple tissues, and, in a wider acceptance, with the finer anatomy of all the organs and parts of the body. Histology, like anatomy, has had a somewhat technical or descriptive rôle assigned to it; and it is now mainly under physiology that the processes, activities, or living mechanisms of the body fall to be considered. The development of the body as a whole, and of its several tissues and organs, forms the subject of embryology; many of the physiological types of diseased processes, especially the cellular, are discoverable in the embryological period. For the period of development, no arbitrary separation has been attempted hitherto between structure and function, and embryology is, in theory at least, as much physiological as anatomical. The development of function is a legitimate and even desirable subject of scientific study, and a more distinctive place is probably awaiting it in the future; but so indissoluble does the union of structure and function present itself in the period of genesis and growth that the function has hardly as yet come to be abstracted from the structure, or the structure from the function.

The theory of disease rests, therefore, upon physiology, with its more or less technical adjuncts. Pathology is all that physiology is, with the engrossing and difficult element of perturbation, deflexion, or shortcoming added. By virtue of this element of deviation from the line of health, pathology is a discipline apart, with an abundant literature of its own, and with separate academical institutes and chairs. But pathology is also a discipline apart by virtue of concepts proper to itself. A great part of the theory of disease deals with changes or defects of structure and perturbations or failings of function, which may be intricate or difficult to analyze, but are still well within sight of the line of health. Such are the common diseases of the organs and systems—the inflammations, catarrhs, degenerations, hypertrophies, and functional derangements without lesion of the respiratory, circulatory, nervous, genito-urinary, locomotor, and cutaneous systems. Constitutional or general diseases belong also to the province of perturbations from the physiological course—such diseases as chlorosis, leukaemia, diabetes, gout, rheumatism, scurvy, rickets, Addison's disease, exophthalmic goitre, and the febrile state. Again, congenital deficiencies or malformations, non-cancerous tumors, and the repairing of injuries exemplify no other laws than those of development and growth.

But with those examples the catalogue of physiolog-

ical diseases is exhausted. We are left with a vast residue of diseases, which have always bulked largely in the popular mind, and have carried the most terrible associations with them. Such are the pestilences or diseases of peoples—the plague, sweating sickness, cholera, yellow fever, typhus fever, relapsing fever, typhoid fever, diphtheria, smallpox, measles, scarlet fever, influenza, dengue. Such also are the cancers, consumptions, leprosy, and other loathsome infections. This enormous residue is more than the half of disease, and the definition of disease or the scheme of pathology is brought to a test in finding room within its scientific categories for such maladies as those. The popular imagination in all countries has personified them; medicine in its metaphysical period has regarded them as entities or things in themselves; and it remains to be seen in what way or to what extent medicine in its scientific period will bring them within the category of perturbations of the physiological life.

In considering, for a moment, where to place cancer in the pathological scheme, we shall arrive at a point of view from which the relation of the acute and chronic infections (or contagions) to diseases of the physiological order may be contemplated at least provisionally. Taking cancers, in a generic sense, to mean tumors that have acquired or are possessed of malignancy, we find that such tumors have many points in common with simple tumors—that they have grown out of the tissues of particular organs or parts under particular (functional) circumstances, and that they may, in general terms, be traced back to that point at which they left the line of health (see PATHOLOGY). The tracing back of tumors along the physiological track is often difficult and laborious; but there is no tumor of the body whose origins are not at length discoverable within the limits of physiological action. That which makes any tumor a cancer is something over and beyond; it is a remarkable acquired property of reproducing its structure in manifold copies, or of infecting the organism of which it is itself a part. The tumor thus becomes a semi-dependent power within the body; it may be said, in a political figure, to have acquired *autonomy*, or to have become *imperium in imperio*. A due consideration of such a phenomenon as the infectiveness or cancerousness of some tumors will satisfy one that there are concepts in pathology which carry the investigator entirely beyond physiological bounds or out of sight of the line of health, which bring him face to face with the notion of a disease as a thing in itself, and which thus constitute a peculiar subject-matter. There is nothing that we know among biological phenomena altogether analogous to the semi-independence which an integral part of the body, or condition of the body, manifests toward the organism as a whole, and that, too, strictly in respect of its acquired devious or rebellious habit. The familiar definition of disease, *morbus est vita præter naturam*, which embodies the notion of divergence from the line of health, makes no provision for any acquired autonomy of a morbid state; and that definition has to be supplemented by another, which will recognize the possibility of a disease becoming a thing in itself. The old definition of Van Helmont, *morbus est ens reale subsistens in corpore*, appears to satisfy the requirement; but that definition, although it grew out of the phenomena of disease as observed in fevers, was made too general, and has now associations that are too exclusively ontological and metaphysical. The supplementary definition should be as far as possible in the terms of the principal definition; and we shall provide best in the pathological scheme for such a disease as cancer if, in addition to the formula *morbus est vita præter naturam*, we construct a secondary formula, *morbus est vivum in vivo*.

The notion of autonomy acquired by a morbid state implies, naturally, a pre-autonomous stage of the disease, which had been a mere perturbation of the norm of the body, capable of being measured by the physiological standard. The autonomous stage and the pre-autonomous stage, which may be demonstrated, in individual cases, for cancers, are a philosophical necessity for all other infective diseases that are marked by morphological features, or by structural characters rooted in and growing out of the proper textures of the body. Thus the peculiar skin eruption of smallpox, which is communicable from person to person, along with a distinctive course of fever, must have had pre-autonomous antecedents (not altogether historically vague) in certain casual conditions of the skin and associated constitutional disturbance, which had recurred and become inveterate, and had so attained to a degree of individuality or a point of autonomy at which they began to be propagated as an organic unit. Again, a second group of infections, exemplified by glanders, bovine tubercle, and syphilis, are rooted in deeper textural processes, which must have been at one time (and may still be) set up by the casual operation of ordinary causes, and at length became the occasion of infective mimicry. It is not so easy to picture (and it is not difficult, with a modern dominant school, to ignore) the casual morbid conditions or ordinary physiological perturbations out of which powerful infections like cholera, typhoid fever, or yellow fever may have arisen; but if the rise and consolidation of their autonomy be a subtle or even untraceable history, yet there are diseases, such as dysentery and erysipelas, which are apt to occur both as casual or spontaneous conditions and as specific infections side by side. Ophthalmia is an example of a purulent catarrh which is constantly arising *de novo* in Egypt from local causes in a non-infective manner, and yet has become, on at least one memorable occasion, a powerful and wide-spread infection for British troops returning from that country and for the home garrisons for many years subsequently. Infective pneumonia in cattle, and more rarely in man, is an analogous case. In such an episode we observe the actual rise of the disease-autonomy. Again, all the infective diseases have degrees of intensity, at one extreme of which there must occur the vanishing point of their infective property; and those gradations of infectiveness are nowhere more noticeable than in the relation of cholera to choleraic diarrhoea. Further, the remarkable group of climatic fevers are not communicable from person to person (see MALARIA); in that respect, and for the reason that the liability of the patient is anything but exhausted by one attack, they are examples of fevers without autonomy. There is not one of the infections that may not be profitably studied from the point of view of its autonomy, and of its more or less obscure pre-autonomous stage. That is a point of view from which even the pestilences and other specific diseases may be regarded as coming within the physiological categories. The large residue of diseases, which are more than perturbations of the physiological life, may still be joined by natural descent to the class of simple perturbations, if we can show for them how their autonomy was acquired, or what was their origin as disease-species.

There is an established place in the history of medicine, and there ought therefore to be room in the definition of disease, for epidemic outbreaks of purely psychical diseased states, such as the dancing madness (*Tanzwuth*), and the boys' crusades; the epidemic diffusion of such morbid states is best approached from the point of view of an acquired autonomy (fixed idea) and an infective mimicry.

The physiological definition of disease, *morbus est*

vita præter naturam, affords no place for parasitic diseases. However, the supplementary formula that has been proposed to meet the cases of diseases existing autonomously in the body, *morbus est vivum in vivo*, will meet the case of parasitic diseases also. According to many pathologists of the present generation, the whole class of pestilences, fevers, and specific infections generally are caused by certain species of minute parasites invading the body; according to one form of that hypothesis the distinctive characters or specific marks (morphological and other) of those diseases are neither more nor less than the appropriate effects wrought upon the textures and fluids of the body by the respective species of parasites. In this way the great group of infective diseases, which are apt to be the stumbling-block of a scientific definition and logical scheme of disease, are easily disposed of by placing them beside the otherwise insignificant group of parasitic diseases. Whether all or any of those diseases are due in a sense to the invasion of parasites, or wholly caused by parasites, are questions that naturally fall to be settled by a careful sifting of a mass of evidence which has already proved to be peculiarly rich in opportunities for mistake. It may be expected that the facts of infective parasitism and the facts of acquired disease-autonomy will in the end find their place in a common theory of specific diseases, which might be expressed in terms of the physiological formula *morbus est vita præter naturam* with the rider *morbus est vivum in vivo*.

The theory of remedies, which forms the second division of the science of medicine, is chiefly based on pharmacology or toxicology. If pharmacology be considered as not coëxtensive with toxicology, it will be taken to be in great part pharmacographia, or the systematic description of articles of materia medica—their source, preparation, physical properties, and the like. Toxicology is in its general sense the investigation of the physiological action of drugs, a science which is largely dependent upon experiments on the lower animals; in a more technical sense toxicology relates to the effect of poisons and the art of detecting them (see POISONS). The physiological action of drugs is the key to their therapeutical action. Therapeutics has been defined as “the discovery of the means by which a system of forces competent to eliminate any given perturbation may be introduced into the economy.” The adaptation of remedies to diseases is, however, greatly wanting in precision, and continues to be in large part empirical and traditional. It may be objected to the above definition that all diseases are not reducible to the category of “perturbations,” and that there is a certain scientific justification for the doctrine of specifics. Besides the articles of the materia medica proper, agencies such as electricity, baths, sea-voyages, and changes of climate generally, enter into the consideration of therapeutics, and two of those form the subject of special departments, viz., electro-therapeutics and hydropathy. Regimen and diet are also important factors in the treatment of disease; according to a contention of Hippocrates, it was in the dietetic needs of mankind that the medical art had its origin.

History.—In the state of society pictured by Homer it is clear that medicine has already had a history. We find a distinct and organized profession; we find a system of treatment, especially in regard to injuries, which it must have been the work of long experience to frame; we meet with a nomenclature of parts of the body substantially the same as that employed long afterward in the writings of Hippocrates; in short, we find a science and an organization which, however imperfect as compared with those of later times, are yet very far from being in their beginning.

It is only from non-medical writers that anything is known of the development of medicine in Greece before the age of Hippocrates.

The grand characteristic of Hippocratic medicine is the singular artistic skill and balance with which the Hippocratic physician used such materials and tools as he possessed.

The actual science of the Hippocratic school was, of course, very limited. In anatomy and physiology little advance had been made, and so of pathology in the sense of an explanation of morbid processes or knowledge of diseased structures there could be very little. The most valuable intellectual possession was a large mass of recorded observations in individual cases and epidemic diseases. Whether these observations were systematic or individual, and how they were recorded, are points of which we are quite ignorant.

Though the Hippocratic medicine was so largely founded on observation, it would be an error to suppose that dogma or theory had no place. The dominating theory of disease was the *humoral*, which has never since ceased to influence medical thought and practice. According to this celebrated theory, the body contains four humors—blood, phlegm, yellow bile, and black bile—a right proportion and mixture of which constitute health; improper proportions or irregular distribution, disease. Another Hippocratic doctrine, the influence of which is not even yet exhausted, is that of the healing power of nature. Not that Hippocrates taught, as he was afterward reproached with teaching, that nature is sufficient for the cure of diseases; for he held strongly the efficacy of art. But he recognized, at least in acute diseases, a natural process which the humors went through—being first of all *crude*, then passing through *coction* or digestion, and finally being expelled by resolution or *crisis* through one of the natural channels of the body. The duty of the physician was to foresee these changes, “to assist or not to hinder them,” so that “the sick man might conquer the disease with the help of the physician.” The times at which crises were to be expected were naturally looked for with anxiety; and it was a cardinal point in the Hippocratic system to foretell them with precision. *Prognosis*, or the art of foretelling the course and event of the disease, was a strong point with the Hippocratic physicians. In this they have perhaps never been excelled. Diagnosis, or recognition of the disease, must have been necessarily imperfect, when no scientific nosology, or system of disease, existed, and the knowledge of anatomy was quite inadequate to allow of a precise determination of the seat of disease; but symptoms were no doubt observed and interpreted skillfully.

The century after the death of Hippocrates is a time almost blank in medical annals. It is probable that the science, like others, shared in the general intellectual decline of Greece after the Macedonian supremacy; but the works of physicians of the period are almost entirely lost, and were so even in the time of Galen.

The dispersion of Greek science and intellectual activity through the world by the conquests of Alexander and his successors led to the formation of more than one learned center, in which medicine among other sciences was represented. Pergamum was early distinguished for its medical school; but in this as in other respects its reputation was ultimately effaced by the more brilliant fame of Alexandria. It is here that the real continuation and development of Hippocratic medicine can be traced.

Two eminent names stand in the first rank as leaders of the two earliest schools of medicine which arose in Alexandria, Herophilus and Erasistratus.

The Erasistrateans paved the way for what was in some respects the most important school which Alexandria produced, that known as the empiric, which, though it recognized no master by name, may be considered to have been founded by Philinus of Cos (280 B.C.), a pupil of Herophilus; but Serapion, a great name in antiquity, and Glaucias of Tarenton, who traced the empirical doctrine back to the writings of Hippocrates, are also named among its founders. The most striking peculiarity of the empirics was that they rejected anatomy, regarding it as useless to inquire into the causes of things, and thus, as they contended, being the more minute in their observation of the actual phenomena of disease. They professed that their whole practice was based upon experience, to which word they gave a special meaning. Three sources, and three only, could experience draw from—observation, history (*i.e.*, recorded observation), and judgment by analogy. These three bases of knowledge were known as the “tripod” of the empirics.

If we look at the work of the Alexandrian schools in medicine as a whole, we must admit that the progress made was great and permanent. The greatest service rendered to medicine was undoubtedly the systematic study of anatomy.

The Romans cannot be said to have at any time originated or possessed an independent school of medicine. They had from early times a very complicated system of superstitious medicine, or religion, related to disease and the cure of disease, borrowed, as is thought, from the Etruscans; and, though the saying of Pliny that the Roman people got on for six hundred years without doctors was doubtless an exaggeration, and not, literally speaking, exact, it must be accepted for the broad truth which it contains. When a medical profession appears, it is, so far as we are able to trace it, as an importation from Greece.

Although no system or important doctrine of medicine was originated by the Roman intellect, and though the practice of the profession was probably almost entirely in the hands of the Greeks, the most complete picture which we have of medical thought and activity in Roman times is due to a Latin pen, and to one who was, in all probability, not a physician, A. Cornelius Celsus.

We now come to the writer who, above all others, gathered up into himself the divergent and scattered threads of ancient medicine, and out of whom again the greater part of modern European medicine has flowed. Galen was a man furnished with all the anatomical, medical, and philosophical knowledge of his time; he had studied all kinds of natural curiosities, and had stood in near relation to important political events; he possessed enormous industry, great practical sagacity, and unbounded literary fluency.

Galen was as devoted to anatomical and, so far as then understood, physiological research as to practical medicine. He worked enthusiastically at dissection, though, the liberty of the Alexandrian schools no longer existing, he could dissect only animals, not the human body. In his anatomical studies Galen had a twofold object—a philosophical, to show the wisdom of the Creator in making everything fit to serve its purpose, and a practical, to aid the diagnosis, or recognition, of disease. The first led him into a teleological system so minute and overstrained as to defeat its own end; the second was successfully attained by giving greater precision and certainty to medical and surgical practice in difficult cases.

The Byzantine school of medicine, which closely corresponds to the Byzantine literary and historical schools, followed closely in Galen's footsteps, and its writers were chiefly compilers and encyclopædists.

In the West the period after Galen affords little evidence of anything but a gradual though unvarying decline in Roman medicine.

The rise of the Mohammedan empire, which influenced Europe so deeply both politically and intellectually, made its mark also in the history of medicine. As in the parallel case of the Roman conquest of Greece, the superior culture of the conquered race asserted its supremacy over their Arab conquerors. After the Mohammedan conquests became consolidated, and learning began to flourish, schools of medicine, often connected with hospitals and schools of pharmacy, arose in all the chief seats in Moslem power. At Damascus Greek medicine was zealously cultivated with the aid of Jewish and Christian teachers. In Bagdad, under the rule of Hárún el Rashíd and his successors, a still more flourishing school arose, where numerous translations of Greek medical works were made.

AVICENNA (*q.v.*) has always been regarded as the chief representative of Arabian medicine. The work by which he is chiefly known, the celebrated "canon," is an encyclopædia of medical and surgical knowledge, founded upon Galen, Aristotle, the later Greek physicians, and the earlier Arabian writers, singularly complete and systematic, but is thought not to show the practical experience of its author.

In medical as in civil history there is no real break. A continuous thread of learning and practice must have connected the last period of Roman medicine already mentioned with the dawn of science in the Middle Ages. The chief homes of medical as of other learning in these disturbed times were the monasteries. The study of Hippocrates, Galen, and other classics was recommended by Cassiodorus (sixth century), and in the original mother-abbey of Monte Cassino medicine was studied; but there was not there what could be called a medical school; nor had this foundation any connection (as has been supposed) with the famous school of Salerno.

The origin of this, the most important source of medical knowledge in Europe in the early Middle Ages, is involved in obscurity. It is known that Salerno, a Roman colony, in a situation noted in ancient times for its salubrity, was in the sixth century at least the seat of a bishopric, and at the end of the seventh century of a Benedictine monastery, and that some of the prelates and higher clergy were distinguished for learning, and even for medical acquirements. In the ninth century Salernitan physicians were already spoken of, and the city was known as *Civitas Hippocratica*. A little later we find great and royal personages resorting to Salerno for the restoration of their health, among whom was William of Normandy, afterward the Conqueror. The reputation of the school was great till the twelfth or thirteenth century, when the introduction of the Arab medicine was gradually fatal to it. The foundation of the university of Naples, and the rise of Montpellier, also contributed to its decline.

About the middle of the eleventh century the Arabian medical writers began to be known by Latin translations in the Western world. It is needless to point out the influence of the crusades in making Eastern ideas known in the Western world. The influence of Arabian medicine soon began to be felt even in the Hippocratic city of Salerno, and in the thirteenth century is said to have held an even balance with the older medicine. After this time the foreign influence predominated; and by the time that the Aristotelian dialectic, in the introduction of which the Arabs had so large a share, prevailed in the schools of Europe, the Arabian version of Greek medicine reigned supreme in the medical world.

The supremacy of Arabian medicine lasted till the

revival of learning, when the study of the medical classics in their original language worked another revolution. The medical writers of this period, who chiefly drew from Arabian sources, have been called Arabists (though it is difficult to give any clear meaning to this term), and were afterward known as the neoterics.

The impulse which all departments of intellectual activity received from the revival of Greek literature in Europe was felt by medicine among the rest.

Two of the most important results of the revival of learning were indeed such as are excluded from the scope of this brief sketch, namely, the reawakening of anatomy, which to a large extent grew out of the study of the works of Galen, and the investigation of medicinal plants, to which a fresh impulse was given by the revival of Dioscorides and other ancient naturalists. The movement of reform started, of necessity, with scholars rather than practicing physicians—more precisely with a group of learned men, whom we may be permitted, for the sake of a name, to call the medical humanists, equally enthusiastic in the cause of letters and of medicine. From both fields they hoped to expel the evils which were summed up in the word barbarism. Nearly all mediæval medical literature was condemned under this name; and for it the humanists proposed to substitute the originals of Hippocrates and Galen, thus leading back medicine to its fountain-head.

In another direction the foundations of modern medicine were being laid during the sixteenth century, namely, by the introduction of clinical instruction in hospitals. In this Italy, and especially the renowned school of Padua, took the first step, where De Monte (Montanus), gave clinical lectures on the patients in the hospital of St. Francis, which may still be read with interest.

The medicine of the early part of the seventeenth presents no features to distinguish it from that of the preceding century. The practice and theory of medicine were mainly founded upon Hippocrates and Galen, with ever-increasing additions from the chemical school. But the development of mathematical and physical science soon introduced a fundamental change in the habits of thought with respect to medical doctrine.

The dominant factors in the seventeenth century medicine were the discovery of the circulation by Harvey (published in 1628), the mechanical philosophy of Descartes and the contemporary progress of physics, the teaching of Van Helmont and the introduction of chemical explanations of morbid processes, and finally, combined of all these, and inspiring them, the rise of the spirit of inquiry and innovation, which may be called the scientific movement.

At the same time the discovery of new diseases, unknown to the ancients, and the keener attention which the great epidemics of plagues caused to be paid to those already known, led to more minute study of the natural history of disease.

The medicine of the eighteenth century is notable, like that of the latter part of the seventeenth, for the striving after complete theoretical systems. At this time a galaxy of great names appears on the roll of medical teachers.

Hermann Boerhaave (1668–1738) was emphatically a great teacher. He was for many years professor of medicine at Leyden, where he lectured five hours a day, and excelled in influence and reputation, not only his greatest forerunners, Montanus of Padua and Sylvius of Leyden, but probably every subsequent teacher. The hospital of Leyden, though with only twelve beds available for teaching, became the center of medical influence in Europe. Many of the leading English physicians of the eighteenth century studied there; Van Swieten, a pupil of Boerhaave, transplanted the latter's

method of teaching to Vienna, and founded the noted Vienna school of medicine. As the organizer, and almost the constructor, of the modern method of clinical instruction, the services of Boerhaave to the progress of medicine were immense, and can hardly be overrated. In his teaching, as in his practice, he avowedly followed the method of Hippocrates and Sydenham, both of whom he enthusiastically admired.

Friedrich Hoffmann (1669-1742), like Boerhaave, owed his influence, and perhaps partly his intellectual characteristics, to his academical position. He was, in 1693, appointed the first professor of medicine in the university of Halle, then just founded by the elector Frederick III. Here he became, as did his contemporary and rival, Stahl, a popular and influential teacher, though their university had not the European importance of Leyden. Hoffmann's "system" was apparently intended to reconcile the opposing "spiritual" and "materialistic" views of nature, and is thought to have been much influenced by the philosophy of Leibnitz.

George Ernest Stahl (1660-1734) was for more than twenty years professor of medicine at Halle, and thus a colleague of Hoffmann, whom he resembled in constructing a complete theoretical system, though their systems had little or nothing in common. Stahl's chief aim was to oppose materialism.

Albrecht von Haller (1708-77) was a man of even more encyclopædic attainments than Boerhaave. He advanced chemistry, botany, anatomy, as well as physiology, and was incessantly occupied in endeavoring to apply his scientific studies to practical medicine, thus continuing the work of his great teacher Boerhaave. Besides all this he was probably more profoundly acquainted with the literature and bibliography of medicine than anyone before or since.

The work of Giovanni Battista Morgagni (1682-1771) had and still preserves a permanent importance beyond that of all the contemporary theorists.

William Cullen (1712-90) was a most eminent and popular professor of medicine at Edinburgh. The same academical influences as surrounded the Dutch and German founders of systems were doubtless partly concerned in leading him to form the plan of a comprehensive system of medicine. Cullen's system was largely based on the new physiological doctrine of irritability, but is especially noticeable for the importance attached to nervous action.

It is difficult to form a clear estimate of the importance of the last systematizer of medicine, John Brown (1735-88), for, though in England he has been but little regarded, the wide though short-lived popularity of his system on the Continent shows that it must have contained some elements of brilliancy, if not originality.

Before the theoretic tendency of the eighteenth century was quite exhausted, it displayed itself in a system which, though in some respects isolated in the history of medicine, stands nearest to that of Brown—that, namely, of Hahnemann (see HOMŒOPATHY). Hahnemann (1753-1844) was in conception as revolutionary a reformer of medicine as Paracelsus. He professed to base medicine entirely on a knowledge of symptoms, regarding all investigation of the causes of symptoms as useless. While thus rejecting all the lessons of morbid anatomy and pathology, he put forward views respecting the causes of disease which hardly bear to be seriously stated.

In looking back on the repeated attempts in the eighteenth century to construct a universal system of medicine, it is impossible not to regret the waste of brilliant gifts and profound acquirements which they involved. It was fortunate, however, that the accumulation of positive knowledge in medicine did not cease.

While Germany and Scotland, as the chief homes of abstract speculation, gave birth to most of the theories, progress in objective science was most marked in other countries—in Italy first, and afterward in England and France.

One novelty, however, of the first importance, is due to a Vienna physician of the period, Leopold Avenbrugger (1722-1809), the inventor of the method of recognizing disease in the chest by percussion. Avenbrugger's method was that of *direct* percussion with the tips of the fingers, not that which is now used, of *mediate* percussion with the intervention of a finger or plessimeter; but the results of his method were the same, and its value nearly as great.

It is not possible to carry the history of medicine, in a sketch such as this, beyond the early years of the nineteenth century, both because the mass of details becomes so large as to require more minute treatment, and because it is difficult as we approach our own times to preserve the necessary historical perspective. It was, however, in this period that what we regard as the modern school of medicine was formed, and took the shape which it has preserved to our own days. The characteristic of the modern school is the adoption in medicine of the methods of research of physical science, and the gradually declining importance attached to theory and abstract reasoning—hypotheses, though not neglected, being used as means of research rather than as ultimate conclusions. Its method may therefore be called the positive method, or that of rational empiricism. The growth of the new school was first seen in two European countries, in France and England. Germany entered the field later. In the United States the science of medicine has kept pace with all other branches of knowledge, and no country boasts of more successful teachers and practitioners or more daring and original investigators.

MEDINA, or rather EL-MEDÍNA (the city), or MEDÍNAT RASÚL ALLÁH (the city of the apostle of God), a town of Hijáz in Arabia, the refuge of Mohammed on his flight from Mecca, and a renowned place of Moslem pilgrimage, consecrated by the possession of his tomb. The name El-Medína goes back to the Koran; the old name was Yathrib, the Lathrippa of Ptolemy and Iathrippa of Stephanus Byzantius.

MEDINA, a New York town, of Orleans county, has several manufacturing establishments, numerous churches, schools, etc. It has banks, railroad connections, and telegraphs. Near by are extensive quarries which furnish good building stone. Population (1890), 5,000.

MEDINA SIDONIA, a town of Spain, in the province of Cadiz, and about twenty-one miles by road westward from that city, stands at a height of 600 feet above the sea-level, on an isolated hill surrounded by a cultivated plain. The population in 1889 was 12,234.

MEDITERRANEAN SEA. The southern shores of Europe are separated from the northern shores of Africa by the Mediterranean Sea. The length of this body of water from Gibraltar to its eastern extremity in Syria is about 2,100 miles. Its breadth is very various, being 400 miles from the mouth of the Rhone to the Algerian coast, 500 miles from the Gulf of Sidra to the entrance to the Adriatic, and 250 miles from the mouth of the Nile to the south coast of Asia Minor. From the very indented nature of its coasts, the general mass of the water is much cut up into separate seas, which have long borne distinctive names, as the Adriatic, the Ægean, the Sea of Marmora, the Black Sea, etc. The area of the whole system, including the Sea of Azoff, is given as 1,149,287 square miles. If we deduct that of the Black Sea and Sea of Azoff, 172,506 square miles.

we have for the area of the Mediterranean proper 976,781, or, roughly speaking, a million of square miles.

The Mediterranean is sharply divided into two great principal basins, the western and the eastern or Levant basin. The western possesses a comparatively smooth and unindented coast-line. It is bounded on the south by the coast of Africa and the north coast of Sicily, and it is further inclosed by the coasts of Spain, France, and Italy, which form a roughly arc-shaped coast-line. There are comparatively few small islands in this basin, though some of the more important large ones occur in it. The eastern basin is by far the larger of the two, and extends from Cape Bon to the Syrian coast, including as important branches the Adriatic and the Ægean. The latter is connected directly, through the Hellespont, the Sea of Marmora, and the Bosphorus, with the Black Sea. The entrance to the western basin and to the sea generally from the ocean is through the Straits of Gibraltar. The greatest depth on the shallowest ridge reaching from the African to the Sicilian coast is under 200 fathoms, and agrees very closely with the corresponding depth at the entrance of the Straits of Gibraltar.

So far as is at present known, the maximum depth is pretty nearly alike in the two basins, being 2,040 fathoms in the western, and 2,150 fathoms in the eastern.

The deepest water of the Mediterranean is found in the widest part between Malta and Crete, and the deep water comes close up to the Italian and Greek coasts, while on the African shore the water shoals more gradually. There is authentic historical evidence of the encroachment of the Italian shores on the Adriatic, causing thereby a diminution of its area. As a consequence many towns which were once thriving seaports are now many miles inland; thus Adria, which was a station of the Roman fleet, is now fifteen miles inland, and there are many similar examples. The large rivers, Po and Adige, which bring the drainage of the southern slopes of the Alps to the sea, deliver large quantities of sediment in the course of the year. The distribution of this mud is affected, not only by its own weight tending to make it sink to the bottom, but also by the set of the currents, which, running up the eastern coast, turn to the westward and southward at the upper end of the sea, and so tend to distribute the river mud along the bottom in the neighborhood of the Italian coasts. The fact that towns which were formerly seaports are now inland does not, therefore, necessitate the assumption of a general rise of the land, it is merely a reclamation by natural agencies of land from the sea at the expense of the inland mountainous country. Precisely similar phenomena are observed in the neighborhood of the mouths of the Rhone and of the Nile.

The water of the Mediterranean proper is very much saltier than either the Atlantic on the west or the Black Sea on the east, and this great density of the water affords a useful means of recognizing it when investigating the interchange of waters which takes place at the two extremities of the sea. Both the temperature and the specific gravity of the water are evidences of the local climate. The great concentration of the water shows how dry the atmosphere at the surface must be, and how insignificant the contributions of fresh water. That the level and the salinity of the Mediterranean remain constant is due to the supply of water which enters at the Straits of Gibraltar. The currents in this passage have frequently engaged attention both from their scientific and from their nautical interest.

The mean temperature of the water of the Mediterranean at a depth of 100 fathoms or more has been found to be between 56° and 57° Fahr. This result was obtained by several expeditions making surveys, all using different methods and instruments.

The great value of such a volume of water as an equalizer of temperature on its shore must be apparent, though in this respect it is inferior to the Atlantic Ocean in its immediate neighborhood. Places on the west coast of Spain and Portugal have a much higher winter temperature and lower summer temperature than places in the same latitude in Italy. The reason of this is simple: on the Atlantic coast the principal winds in winter are from the southwest, and have a warming effect, while in summer the source of the northeast trade winds is pushed back into the Bay of Biscay, causing in this season constant northerly winds along the coast of Portugal. The winds of the Mediterranean have no seas of remote latitudes to draw on for either heating or cooling purposes, though the sandy deserts of Africa which bound its southern coasts have at certain seasons a very decided influence on the climate. The tempering action of the sea does not extend very far inland, as is evident from the climate of inland towns in Italy.

MEDLAR, *Mespilus Germanica*, L., of the tribe *Pomeæ* of the order *Rosaceæ*, regarded by Bentham and Hooker as a subgenus of *Pyrus*, is a native of European woods, etc., from Holland southward, and of western Asia. The medlar was well known to the ancients. The well-known fruit is globular, but depressed above, with leafy persistent sepals, and contains stones of a hemispherical shape. It is not fit to eat until it begins to decay.

MÉDOC is the name given to the district in France adjoining the left bank of the Gironde from Ambès, the point where the Garonne and Dordogne unite, to Lesparre; a fifth part of its soil is occupied by vineyards, the products of which form the finest growths of Bordeaux. Of these the most esteemed are Château-Margaux, Château-Lafitte, and Château-Latour.

MEDUSA. See GORGON. See also HYDROZOA.

MEDYN, a district town of Russia, situated in the government of Kaluga, thirty-nine miles northwest of the capital of the province, on the highway from Moscow to Warsaw.

MEER, JAN VAN DER, of Delft—not to be confounded with the elder or younger Van der Meer of Haarlem or with Van der Meer of Utrecht—is one of the excellent painters of Holland about whom the Dutch biographers give us little information. Van der Meer, or Vermeer, by which name he is also known, was born in Delft in 1632. In 1653 he married Catherine Bolenes, and in the same year he entered the guild of St. Luke of Delft, becoming one of the heads of the guild in 1662, and again in 1670. He died at Delft in 1675, leaving a widow and eight children.

MEERANE, a rapidly increasing industrial town in southeastern Saxony, lies in the district of Zwickau, about thirty-seven miles to the south of Leipsic. The population in 1880 was 22,293.

MEERSCHAUM. This German name is applied to a certain mineral, in consequence of its lightness, softness, and white color, which suggest a resemblance to "sea-foam." By the German mineralogist Glocker it was termed *sepiolite*, in allusion to its resemblance to the so-called bone of the sepia or cuttle-fish. Possibly the fact that pieces of meerschaum, washed out of their matrix, are occasionally found floating on the Black Sea, may have led to the association of the mineral with marine products. Meerschaum is an opaque earthy mineral, of white, grayish, or yellowish color, compact in texture, and breaking with a conchoidal or fine earthy fracture; it adheres to the tongue and is so soft as to be scratched by the nail. Its specific gravity varies from 0.988 to 1.279; hence it floats in sea-water until saturated. Meerschaum is a hydrated silicate of mag-

nesium. Most of our meerschaum comes from Asia Minor, especially from the plains of Eski-shehr, where it occurs in nodular masses, of variable size and irregular shape, distributed through the alluvial deposits of the plain, which are systematically worked for its extraction by means of pits and galleries.

By far the greatest quantity of meerschaum is used in the manufacture of tobacco-pipes, a purpose for which it is well fitted by its porosity.

MEERUT, or MÍRATH, a district in the division of Meerut and the lieutenant-governorship of the North-western Provinces, India. The area in 1881 was given as 2,361 square miles. Population, 1,500,000.

MEERUT, a city and cantonment in the above district, is situated about half way between the Ganges and the Jumna. The city proper lies south of the cantonments, and although a very ancient town, dating as far back as the days of the Buddhist emperor Asoka, (circ. 250 B.C.) Meerut owes its modern importance to its selection by the British Government as the site of a great military station.

MEGALOPOLIS, a city of southern Arcadia, situated in a plain about twenty miles southwest of Tegea, on both banks of the Helisson, about two and one-half miles above its junction with the Alpheus. It was fifty stadia in circumference, and was surrounded with strong walls. Its territory was the largest in Arcadia, extending northward twenty-four miles. The city was built on a magnificent scale, and adorned with many handsome buildings, both public and private.

MEGALOSAURUS. See REPTILES.

MEGAPODE, the name given generally to a small but remarkable family of birds, highly characteristic of some parts of the Australian region, which morphologically seem to be the lowest of the order, with which apparent fact may perhaps be correlated their singular habit of leaving their eggs to be hatched without incubation, burying them in the ground (as many reptiles do) or heaping over them a mound of earth, leaves, and rotted wood. The Australian bird is of a sooty-brown color, relieved beneath by the lighter edging of some of the feathers, but the head and neck are nearly bare, beset with fine bristles, the skin being of a deep pinkish-red, passing above the breast into a large wattle of bright yellow. The tail is commonly carried upright and partly folded, something like that of a domestic fowl.

The next form of which we may speak is another inhabitant of Australia, commonly known in England as the Mallee-bird, but to the colonists as the "Native Pheasant," which has much shorter tarsi and toes, the head entirely clothed, and the tail expanded. Its plumage presents a pleasing combination of grays and browns of various tints, interspersed with black, white, and buff, the wing coverts and feathers of the back bearing each near the tip an oval or subcircular patch, while a stripe of black feathers with a median line of white extends down the front of the throat, from the chin to the breast.

Of the Megapodes proper, constituting the genus *Megapodius*, many species have been described, but authorities are greatly at variance as to the validity of several, and here it would be impossible to name all that have been supposed to exist. Some are only known from very young examples—mere chickens; and some have even been described from their eggs alone.

MEGARA was the name of two Greek towns, one in Sicily, which has been already described under HYBLA, the other on the road from Attica to Corinth. The town was one of the most important commercial and colonizing centers of Greece in early times, and there is no doubt that its trade, like that of Corinth, owed its

origin to the Phoenicians, who found its situation on the isthmus convenient.

The situation of Megaris on the isthmus gave it great political power, inasmuch as it commanded all the roads from the Peloponnesus into continental Greece; and so long as the people continued united under an orderly government they maintained their high position. The city maintained a flourishing existence throughout the Greek and Roman periods, but played a very subordinate part in history. In the unsettled time when the Roman empire had decayed, it was often plundered by pirates.

MEGATHERIUM is the name given by Cuvier to a large extinct animal belonging to the order *Edentata*.

The following description will apply especially to the best-known South American form, *Megatherium americanum*. In size it exceeded any existing land animal except the elephant, to which it was inferior only in consequence of the comparative shortness of its limbs, for in length and bulk of body it was its equal, if not superior. The full length of a mounted skeleton from the fore part of the head to the end of the tail is eighteen feet, of which the tail occupies five feet. The head, which is small for the size of the animal, presents a general resemblance to that of the sloth. In number the teeth exactly resemble those of the sloths, being five above and four below on each side, and they are limited to the lateral parts of the mouth, front teeth being entirely wanting. The vertebral column consists of seven cervical, sixteen dorsal, three lumbar, five sacral, and eighteen caudal vertebræ.

The tail is large, and its basal vertebræ have strong lateral and spinous processes and chevron bones, indicating great muscular development. The clavicle is complete and very large, much resembling that of man on a large scale. The fore limbs are longer than the hind limbs. The radius and ulna are both well developed, and have a considerable amount of freedom of movement. The hand is singularly modified. The first digit is represented only by a rudimentary metacarpal, but the next three are large, and terminate in phalanges adapted for the support of immense claws, the middle one being especially large. The outer or fifth digit has no claw, and it may be considered as certain that the weight of the foot was, in standing and walking, chiefly thrown upon this, and that it was protected by a callous pad beneath, as in the existing great anteater, while the other toes were curved inward toward the palm, only coming in contact with the ground by their outer surfaces. The pelvis is remarkably wide, even more so than that of the elephant, but it is formed on the same principle as in the sloths. The femur is extremely broad and flattened; the tibia and fibula are short and strong, and united together at each end. The hind foot, contrary to the usual rule in the *Edentata*, is even more singularly modified than the hand. The ankle-joint is formed upon a peculiar plan quite unlike that of the sloths, or of any other mammal, except the *Megatherium's* nearest allies. The calcaneum projects nearly as far backward as the forepart of the foot does forward. There is no trace of great toe or hallux, or of its corresponding cuneiform bone. The second toe is rudimentary. The third has an enormous ungual phalanx, which, like those of the maned, is remarkable for the immense development of the bony sheath which is reflected from its proximal end around the base of the claw. The two outer toes have large and very peculiarly-shaped metatarsals, but only small phalanges, and no claws. The creature probably walked upon the outer edges of the sole, so that the great falcate claw of the third toe did not come into contact with the ground, and so was kept in a state of

sharpness ready for use. The foot was therefore formed upon quite a different principle from that of the anteaters or sloths, though somewhat like the latter in having two of the toes aborted.

Taking all the various points of its structure together, they clearly indicate affinities both with the existing sloths and with the anteaters, the skull and teeth more resembling those of the former, and the vertebral column and limbs the latter. It is not difficult to infer the food and habits of this enormous creature. That it was a leaf-eater there can be little doubt, but the greater size and more complex structure of its teeth might have enabled it to crush the smaller branches as well as the leaves and succulent shoots which form the food of the existing sloths. It is, however, very improbable that it climbed into the branches of the trees like its diminutive congeners, but it is far more likely that it obtained its subsistence by tearing them down with the great hook-like claws of its powerful prehensile fore limbs, being easily enabled to reach them by raising itself up upon the massive tripod formed by the two hind feet, firmly fixed to the ground by the one huge falcate claw, and the stout, muscular tail. The whole conformation of the hinder part of the animal is strongly suggestive of such an action. There can also be little doubt but that all its movements were as slow and deliberate as those of its modern representatives.

MEGHNÁ, a river of India, forming, in the lower part of its course, the great estuary of the Bengal delta, which conveys to the sea the main body of the waters of the Ganges and the Brahmaputra, which unite at Góalánda in Farídpur district. The river enters the sea by four principal mouths, inclosing the three large islands of Dakshin Shábazpur, Hatia, and Sandwíp. It is navigable by native boats of the largest burden, and also by river steamers, all the year through; but the navigation is difficult, and sometimes dangerous, on account of shifting sand-banks and "snags," and boisterous weather when the monsoon is blowing.

MEHÁDIA, a market-town in the county of Szörény, Hungary, is situated on the Bella-Reka, or Bereka, thirteen and a half miles north of Orsova. Mehádía is chiefly of importance as the station for the Hercules Baths, distant about three miles east from the town, and situated in a narrow pass in the romantic valley of the Cserna. Of the twenty-two hot springs of Mehádía, nine are now in use, the most powerful one being the Hercules, which yields about 5,000 cubic feet of water per hour. The springs are all strongly impregnated with salts of sulphur, iodine, bromine, and chlorine, and their average temperature is 70° to 145° Fahr. They are much used for chronic rheumatism, gout, and cutaneous eruptions, and, during the season, which usually lasts from the middle of May to the end of September, are resorted to by over a thousand visitors.

MEHEMET ALI, or MOHAMMED'ALÍ. See EGYPT.

MÉHUL, ÉTIENNE HENRI, one of the most remarkable composers of France, was born at Givet, in Ardennes, on June 24, 1763, and died in 1817.

MEIBOM, HEINRICH, was born at Lemgo on December 4, 1555, and died on September 20, 1625, at Helmstädt, where he had held the chair of history and poetry from 1583. He was a writer of Latin verses, and his talents in this direction were recognized by the emperor Rudolph II., who ennobled him and made him poet laureate in 1590.

MEININGEN, the capital of the little duchy of Saxe-Meiningen, in central Germany, and the seat of the provincial courts for Saxe-Meiningen, Saxe-Coburg, and the Prussian districts of Schmalkalden and Schleusingen, is situated on the right bank of the Werra,

about forty miles to the south of Eisenach. The population in 1880 was 11,227.

MEISSEN, an ancient and important industrial town of Saxony, is situated on the left bank of the Elbe, between the streams Meisse and Triebisch, in the district and about nine miles to the northwest of the town of Dresden. The population in 1880 was 14,166.

MEKONG, MEKHONG, or MAKONG, less frequently NAM-KONG, the Da-Kio of the Tibetans, the Lantsang-Kiang or Lankiang of the Chinese, and the Son-Kong of the Anamese, sometimes also called the Cambodia or Camboja, is one of the largest and most remarkable rivers in southern Asia. As it rises in Tibet, and reaches the China Sea after a somewhat devious course through Yunnan, Burmah, Siam, Cambodia, and Cochin-China, its total course may be safely stated at 2,000 miles. In spite, however, of this great length, the Mekong must be regarded as little more than a mountain torrent on an unusually large scale.

MELA, POMPONIIUS, a Roman writer on geography. His little work, though a mere compendium, is the only systematic treatise on the subject preserved to us in the Latin language, with the exception of that which forms part of the encyclopædic work of the elder Pliny, and from this circumstance it derives a value to which it would be little entitled from its intrinsic merits. Nothing is known of the author except his name, and that he was born, as he himself informs us, at a small town called Tingentera in the south of Spain.

MELANCHTHON, PHILIP, son of an armorer named George Schwartzerd, was born at Bretten, a town of the lower Palatinate, on February 16, 1497. Taught first by John Hungarus, then by George Simler at the academy of Pfortzheim, where he lived in the house of Reuchlin's sister, young Schwartzerd exhibited remarkable precocity, and speedily won the regard of Reuchlin, who dubbed him Melanchthon (the Greek form of Schwartzerd), according to the fashion of that age. He lived two years at Heidelberg, and the next three at Reuchlin's university of Tübingen, where he studied law, medicine, and theology, taking his doctor's degree in 1514. In 1518, on Reuchlin's recommendation, Melanchthon was appointed by the elector of Saxony professor of Greek in the university of Wittenberg. This appointment marked an epoch in German university education; Wittenberg became the school of the nation. Luther himself received a fresh impulse toward the study of Greek, and his translation of the Scriptures, begun as early as 1517, now made rapid progress, Melanchthon helping to collate the Greek versions and revising Luther's translation.

Melanchthon was first drawn into the arena of the Reformation controversy through the Leipsic discussion, of which he was an eager spectator. He had been sharply reprovved by Doctor Eck for giving aid to Carlstadt, and he was shortly afterward himself attacked by the blustering Ingolstadt doctor. Melanchthon replied in a brief treatise—a model of Christian moderation—setting forth Luther's first principle of the supreme authority of Scripture in opposition to the patristic writings on which Eck so boastfully relied. His marriage, in 1520, to Catherine Krapp of Wittenberg increased his own happiness, and gave a domestic center to the Reformation. In 1521, during Luther's confinement in the Wartburg, Melanchthon occupied the important position of leader of the Reformation cause at the university.

After the first diet of Spire (1526), where a precarious peace was patched up for the Reformed faith, Melanchthon was deputed as one of twenty-eight commissioners to visit the Reformed states and regulate the constitution of churches, he having just published

a famous treatise called the *Libellus Visitatorius*, a directory for the use of the commissioners. At the Marburg conference (1529) between the German and Swiss Reformers, Luther was pitted against (Ecolampadius and Melanchthon against Zwingli in the discussion regarding the real presence in the sacrament. At the diet of Augsburg (1530) Melanchthon was the leading representative of the Reformation. With anxiety and tears he drew up for that diet the seventeen articles of the evangelical faith, which are known as the "Augsburg Confession." He held conferences with Romish divines appointed to adjust differences, and afterward wrote an *Apology for the Augsburg Confession*. After the Augsburg conference further attempts were made to settle the Reformation controversy by a compromise, and Melanchthon, from his conciliatory spirit and facility of access, appeared to the Romanists the fittest of the Reformers to deal with.

In 1537, when the Protestant divines signed the Lutheran Articles of Smalkald, Melanchthon appended to his signature the reservation that he would admit of a pope provided he allowed the gospel and did not claim to rule by divine right.

The year after Luther's death, when the battle of Mühlberg (1547) had given a seemingly crushing blow to the Protestant cause, an attempt was made to weld together the iron and clay of the evangelical and the papal doctrines, which resulted in the compilation by Pflug, Sidonius, and Agricola of the Augsburg *Interim*. This was proposed to the two parties in Germany as a provisional ground of agreement till the decision of the council of Trent. Melanchthon, on being referred to, declared equivocally that, though the *Interim* was inadmissible, yet so far as matters of indifference were concerned it might be received. Hence arose that "adiaphoristic" controversy in connection with which he has been misrepresented as holding among matters of indifference such cardinal doctrines as justification by faith, the number of the sacraments, as well as the dominion of the pope, feast-days, and so on. He afterward retracted his compliance with the adiaphora, and never really swerved from the views set forth in the *Loci Communes*; but he regarded the surrender of more perfect for less perfect forms of truth or of expression as a painful sacrifice rendered to the weakness of erring brethren. Luther, though he had uttered certain expressions of dissatisfaction with Melanchthon, and had more keenly defended in his last years what was distinctively his own, yet maintained hearty and unbroken friendship with him; but after Luther's death certain smaller men arose in name of Luther who formed a party emphasizing the extremest points of the doctrine of the latter. Hence the later years of Melanchthon were much occupied with acrid controversies within the evangelical church; an account of these, however, would be out of place here. His last years were spent in fruitless conferences with his Romanist adversaries, and amid various controversies among the Reformed, but the flame of his piety burnt brightly till the close. He died in his sixty-third year, on April 19, 1560, and his body was laid beside that of Martin Luther.

MELANESIA. This term comprises that long belt of island groups which, beginning in the Indian archipelago at the east limits of the region there occupied by the Malay race, and, as it were, a prolongation of the great island region, runs southeast for a distance of some 3,500 English miles, *i.e.*, from New Guinea at the equator to New Caledonia just within the Tropic, and eastward to Fiji. This chain of groups has a certain geographical as well as ethnical unity. Its curve follows roughly the outline of the Australian coast, and large islands occur, with a number of small ones, along the

whole length, with mountains of considerable height, coinciding pretty closely with a line of volcanic action. Melanesia is usually held to begin with New Guinea, this great island being then viewed as the headquarters of that dark Papuan race which, widely and variously modified in all the other groups, occupies the whole region, as the name Melanesia implies; but the race really extends further west, for the large islands Flores and Timor, with several smaller ones, are also essentially Papuan. The various Melanesian groups will be found described in detail under separate headings.

MELBOURNE, the capital of the colony of Victoria, and most populous city in Australia, is situated at the head of the large bay of Port Phillip, on its northern bend, known as Hobson's Bay, about 500 miles southwest of Sidney by land and 770 by sea. Along the shores of the bay the suburbs extend for a distance of over ten miles, but the part distinctively known as the "city" occupies a site about three miles inland, on the north bank of the Yarra river.

The appearance of Melbourne from the sea is by no means picturesque. The shipping suburbs of Sandridge and Williamstown occupy the alluvial land at the mouth of the Yarra, and, as the district is low and flat, and covered with factories, the prospect is not inviting. But the city itself has a very different aspect; its situation is relieved by numerous gentle hills, which show off to great advantage its fine public buildings; its streets are wide and well kept; and the universal appearance of prosperity, activity, and comfort under its usually clear blue sky impress the visitor favorably.

That part specially known as the "city" had a population, in 1881, of 65,800. It occupies the two hills of East Melbourne and West Melbourne; the valley that separates them, once occupied by a densely wooded little stream, is now partly filled in, and forms the busy thoroughfare of Elizabeth street; parallel to this runs Swanston street, and at right angles to these, and parallel to the river, are Bourke street, Collins street, and Flinders street—the first being the busiest in Melbourne, the second containing the most fashionable shops, and the third, which faces the river, being given over to maritime pursuits. These streets are an eighth of a mile apart; between them are narrower streets occupied by warehouses and business premises.

Around the "city" lies a circle of populous suburbs. Northeast is Fitzroy with 23,000 inhabitants; farther east, Collingwood, 24,000; east of Melbourne, Richmond, 23,400; southeast, Prahran, 21,000; south, Emerald Hill, 25,300; southwest, Sandridge, 8,700; northwest, Hotham, 17,800. These all lie within three miles of the general postoffice in Elizabeth street; but outside of them, and within a radius of five miles, there is a circle of less populous suburbs: to the north, Brunswick, 6,200; east, Kew, 4,200, and Hawthorn, 6,000; southeast, St. Kilda, 11,600, and Brighton, 4,700; southwest, Williamstown, 9,000, and Footscray, 6,000; northwest, Essenden and Flemington, 5,000. Numerous smaller suburbs fill up the spaces between these, the principal being Northcote, Preston, Camberwell, Toorak, Caulfield, Elsternwick, and Coburg, with a united population of 19,000.

In 1888 the population of Melbourne, including that of its suburbs, was estimated at 438,000. Fifteen of the suburbs rank as independent municipalities.

The public buildings are generally situated on positions from which they are seen to advantage. The Parliament Houses form a great pile of brickwork with four fronts in freestone. The interior decorations are highly elaborate. The Treasury is a well-proportioned building in freestone; behind it stands a vast building known as the Government offices. On the hill of West

Melbourne there is a large structure, for the law courts; it has four very handsome fronts, each about 300 feet in length, and the whole is surmounted by a lofty cupola, in the manner of the Capitol at Washington.

The Melbourne University is a picturesque, but by no means imposing, mass of buildings, buried among the trees of extensive and well-kept grounds about a mile from the heart of the city. In front of it stands the "Wilson Hall," erected at a cost of \$200,000. Behind is the National Museum, containing specimens of natural history. The museum, like all public places in Melbourne, is freely open to the people. Melbourne contains many churches, but few of them will compare with the public buildings in appearance.

There are in Melbourne, among its numerous state schools, about thirty whose size and proportions entitle them to rank with the architectural ornaments of the city. They have each accommodation for from 600 to 2,000 scholars. Abundant provision has been made for secondary instruction by the denominations and by private enterprise.

Melbourne contains the offices of numerous banks, savings banks, and building societies.

The parks and public gardens of Melbourne are extensive and handsome.

The shipping of Melbourne is very considerable. In 1880 about 1,500 vessels entered and cleared again, their tonnage being 960,000.

The climate of Melbourne is exceptionally fine, the only drawback being the occasional hot winds which blow from the north for two or three days at a time, and raise the temperature to an uncomfortable extent.

MELBOURNE, WILLIAM LAMB, SECOND VISCOUNT, English statesman, was born March 15, 1779, and died in 1848.

MELCHIADES, or MILTIADES (other forms of the name being Meltiades, Melciades, Milciades, and Miltides), was pope from July 2, 310, to January 10 or 11, 314. He appears to have been an African by birth, but of his personal history nothing is known.

MELCHITES. The name of Melchites means etymologically the royal party, and so is currently applied in the East to Syrian and Egyptian Christians of the Orthodox Greek Church, adherents of the creed supported by the authority of the king, that is, of the Byzantine emperor. The Melchites, therefore, are those who accept the decrees of Ephesus and Chalcedon as distinguished from the Nestorians and Jacobites, and the name reflects in an interesting manner the way in which the doctrinal controversies that agitated the Eastern empire associated themselves with national feelings of antagonism to the imperial rule.

MELCHIZEDEK ("king of righteousness"), king of Salem and priest of "supreme El," brought forth bread and wine to Abram, on his return from the expedition against Chedorlaomer, and blessed him in the name of the supreme God, possessor (or maker) of heaven and earth. And Abram gave him tithes of all his booty. The Bible history tells us nothing more about Melchizedek; but the majestic figure of the king-priest, prior to the priesthood of the law, to whom even the father of all Israel paid tithes, suggested a figurative or typical application; first in Psalm cx. to the vicergerent of Jehovah, seated on the throne of Zion, the king of Israel who is also priest after the order of Melchizedek, and then, after the gospel had confirmed the Messianic interpretation of the Psalm, to the kingly priesthood of Jesus, as that idea is worked out at length in the Epistle to the Hebrews.

MELCOMBE REGIS. See WEYMOUTH.

MELLENDEZ VALDES, JUAN, minor poet of

Spain, was born at Ribera del Fresno, Badajoz, on March 11, 1754, and died in 1817.

MELFI, a city of Italy, in the province of Potenza, thirty miles north of Potenza, on the road and railway between that city and Foggia, is built on a small hill on the lower slopes of Monte Volture. Population (1890), 12,500.

MELITA, the classical name for MALTA (*q.v.*), was also the name borne by the modern *Meleda*, one of the Dalmatian islands, situated immediately to the south of Sabbioncello and to the north of Ragusa. It is about twenty-four miles in length, averaging about one and one-half in breadth, and has a good harbor.

MELITO, bishop of Sardes, a Christian writer of the second century, is mentioned by Eusebius along with Hegesippus, Dionysius of Corinth, Apollinaris of Hierapolis, Irenæus, and others, his contemporaries, as a champion of orthodoxy and upholder of apostolic tradition. Of his personal history nothing is known, and of his numerous works (which are enumerated by Eusebius) only a few fragments are now extant.

MELLONI, MACEDONIO, a distinguished physicist, was born at Parma on April 11, 1798. From 1824 to 1831 he was professor at Parma, but in the latter year he was compelled to escape to France, having taken part in the Revolution. In 1839 he went to Naples as director of the conservatory of arts and handicrafts. He was likewise director of the Vesuvius observatory, a post which he held until 1848. Melloni received the Rumford medal of the Royal Society in 1834. In 1835 he was elected correspondent of the Paris Academy, and in 1839 a foreign member of the Royal Society. He died from an attack of cholera on August 11, 1854.

MELON (*Cucumis Melo*, L.), a most polymorphic species of the order *Cucurbitaceæ*, the varieties of which are grouped by Naudin under ten tribes, while several other plants of less known characteristics probably belong to it. The melon is an annual herb with palmately-lobed leaves, and bears tendrils. It is monoecious, having male and female flowers on the same plant. The flowers have deeply five-lobed campanulate corollas and three stamens. Naudin observed that in some varieties (*e.g.*, of cantaloupes) fertile stamens sometimes occur in the female flowers. It is a native of south Asia, "from the foot of the Himalayas to Cape Comorin," where it grows spontaneously, but is cultivated in the temperate and warm regions of the whole world. It is excessively variable both in its diversity of foliage and habit, but much more so in the fruit, which in some varieties is no larger than an olive, while in others it rivals the ponderous fruits of the gourds, (*Cucurbita maxima*, L.) The fruit may be globular, ovoid, spindle-shaped, or serpent-like, netted or smooth skinned, ribbed or furrowed, variously colored externally, with white, green, or orange flesh when ripe, scented or scentless, sweet or insipid, bitter or even nauseous, etc. Like the gourd, the melon undergoes strange metamorphoses by crossing its varieties, though the latter preserve their characters when alone. The offspring, however, of all crossings are fertile.

MELOS, the modern Milo, one of the Sporades of the Ægean Sea, situated at the southwest corner of the archipelago, seventy-five miles due east from the coast of Laconia. From east to west it measures about fourteen miles, from north to south eight miles, and its area is estimated at fifty-two square miles.

MELROSE, a village of Roxburghshire, Scotland, on the south bank of the Tweed, thirty-seven miles by rail south-southeast of Edinburgh.

It was in the abbey-church of Melrose, where Alexander II. had long before been buried near the high altar, that the heart of Bruce found its final resting-

place; and among the many tombs which afterward gathered under the same roof were those of his faithful knight James Lord Douglas, Sir William the dark knight of Liddesdale, and the hero of Chevy Chase.

MELROSE, a suburb of Boston, in Middlesex county, Mass., seven miles to the north. It has a high school, newspapers, banks, churches, and some manufactures. Population (1890), 8,519.

MELTON MOWBRAY, a market-town of England, county of Leicester, is pleasantly situated in a fertile vale, at the confluence of the Wreake and Eye, fifteen miles northeast of Leicester and 104 north of London by rail.

MELUN, capital of the department of Seine-et-Marne, France, twenty-eight miles southeast of Paris by railway, occupies a hill on the right bank of the Seine and the level ground at its foot. Melun is near one of the most beautiful parts of the forest of Fontainebleau. The population in 1881 was 12,145.

MELVILLE, HENRY DUNDAS, VISCOUNT, British statesman, was born at Edinburgh, in 1741, and died in 1811.

MELVILLE, ANDREW, a distinguished Scottish scholar, theologian, and religious reformer, was the youngest son of Richard Melville, proprietor of Baldov, near Montrose, at which place Andrew was born in 1545 and died in 1622.

MELVILLE, GEORGE JOHN WHYTE, born in 1821, has a right to be regarded as the founder of a school of fashionable novels—the fashionable sporting novel. The eldest son of Major Whyte Melville, of Mount Melville, Fifeshire, he received his school education, like so many of his heroes, at Eton, entered the army in 1839, became captain in the Coldstream Guards in 1846, and retired in 1849. His first appearance in literature was made soon after, with a translation of Horace into fluent and graceful verse, published in 1850. His first novel was *Digby Grand*, published in 1853. When the Crimean War broke out, Whyte Melville took part in it as a volunteer in the Turkish contingent; but this was the only break in his literary career from the time that he began to write novels till his death, in 1878. By a strange accident, he lost his life in the hunting-field, the hero of many a stiff ride meeting his fate in galloping quietly over an ordinary plowed field. Twenty-one novels appeared from his pen after his return from the Crimea.

MELVILL VAN CARNBEE, PIETER, BARON, an eminent Dutch geographer, was born at the Hague May 20, 1816, and died October 24, 1856.

MEMEL, the most northerly town in Germany, and the principal seat of the Baltic timber trade, is situated in the district of Königsberg, Prussia, at the mouth of the Dange, and on the bank of a sound connecting the Kurische Haff with the Baltic Sea. The population of Memel in 1880 was 19,660.

MEMLING, HANS, a painter of the fifteenth century, whose art gave a passing luster to Bruges in the period of its political and commercial decline. The date of his birth is unknown; but his death is said to have occurred in 1477.

MEMMI. See MARTINI, SIMONE.

MEMMINGEN, a town of Bavaria, in the district of Schwaben and Neuburg, is situated about thirty-five miles to the southwest of Augsburg, near the river Iller.

MEMNON. In the Homeric mythology (or rather the mythology of the *Troica* in the much fuller form in which it existed in the times of Pindar and the tragic poets) this hero was called the son of Tithonus (the half-brother of Priam) and Eos (Aurora). Tradition represented him as an Ethiopian prince who came to assist the Trojans against the Greeks, and performed

prodigies of valor, but was at length killed by Achilles, after having himself slain Antilochus, the son of Nestor, an event alluded to by Pindar. His story must have been very famous, for more than one Greek play was composed bearing the title.

MEMPHIS, the capital of the old Egyptian empire, founded by Menes, the first historical king (see EGYPT). In the time of Strabo it was the second city of Egypt, inferior only to Alexandria, and with a mixed population like the latter. Memphis was still an important though declining place at the time of the Moslem conquest. Its final fall was due to the rise of the Arabic city of Fostât on the right bank of the Nile almost opposite the northern end of the old capital; and its ruins, so far as they still lay above ground, gradually disappeared, being used as a quarry for the new city. The remains of "Menf" were still imposing late in the twelfth century, when they were described by 'Abd el-Latif. In the Old Testament Memphis is mentioned under the names of Moph and Noph.

MEMPHIS, a city of the United States, and port of entry, capital of Shelby county, Tenn., is situated on the east bank of the Mississippi river, just below the mouth of Wolf river, 450 miles below St. Louis and 826 miles above New Orleans. The bluff on which the city stands has an average elevation of forty-seven and one-half feet above high-water mark, with a further fall of thirty-six feet to extreme low water. Memphis is methodically and tastefully planned, and is adorned with many elegant private residences and public buildings, conspicuous among the latter being the United States custom-house, located upon the esplanade between Front street and the river, and built of the best quality of marble, the product of Tennessee quarries. A small park in the center of the city contains a bust of Andrew Jackson. The streets are mostly well paved, and are supplied with water from the Wolf river by the Holly system. The bayou Gayoso, with several branches, intersects the city, and prior to 1880 received most of its drainage. Since that date over forty miles of sewers and more than that length of subsoil drain-tiles have been constructed on the Waring system, providing the city with a superior system of drainage.

Memphis is a growing and busy place, and the most important commercial city on the Mississippi between St. Louis and New Orleans. The largest sea-going vessels ascend the river to this point, and navigation is open at all seasons of the year. The city also possesses abundant facilities for transportation by railway in every direction. Memphis ranks as the largest interior cotton market in the United States, the receipts for the season averaging 500,000 bales. The aggregate receipts from the mercantile and manufacturing interests for the year average \$70,000,000, of which the trade in groceries and western products contributes nearly \$45,000,000; dry goods, clothing, boots and shoes, and general merchandise, \$15,000,000; and various home manufactures about \$10,000,000. There are oil-mills and refineries whose annual product of about 30,000 barrels of cotton-seed oil, together with oil-cake and re-ginned cotton, amounts to over \$1,000,000. There are also numerous foundries, machine-shops, flouring-mills, and manufactories of carriages, furniture, and tobacco.

The city contains, besides the usual religious, educational, and commercial institutions, a public library of 9,000 volumes, several daily and weekly newspapers, a chamber of commerce, and a cotton exchange.

Memphis was laid out as a village in 1820, and incorporated as a city in 1831. Its population, according to a census taken on October 1, 1882, within the city limits, was 47,976 (29,130 white and 18,846 colored); 1890, 64,495.

During the civil war Memphis was early occupied by the Union forces (June 6, 1862), after a naval engagement in which Commodore Davis with a fleet of nine gunboats and rams defeated a similar Confederate fleet of eight vessels, and captured or destroyed all of them but one. The city was held by Federal troops to the close of the war, with the exception of a brief occupation, in August, 1864, by General Forrest who captured several hundred prisoners, but immediately withdrew. The decrease of population between 1870 and 1880 was due to the ravages of yellow fever in 1873, 1878, and 1879. The epidemic of 1873 resulted in over 2,000 deaths. In 1878, according to the report of the Howard Relief Association, the number of those attacked with fever was 15,000, and the number of deaths reached the total of 5,150, of whom 4,250 were whites and 900 colored. At the return of the fever in 1879 better care and strict quarantine arrangements prevailed, but there were 1,595 cases, with 497 deaths. During the epidemics of 1878 and 1879 fully two-thirds of the population fled from the city, many of whom died of the fever at other places, and a still larger number did not return. For three months during each year business was wholly suspended, and all ingress or egress except for the most necessary purposes was forbidden. The prostration of the business of the place left the city almost hopelessly bankrupt, and as a means of relief the legislature of the state, in January, 1879, repealed the city's charter, and, assuming exclusive control of its taxation and finances, constituted it simply a "taxing district," placing its government in the hands of a "legislative council." This anomalous proceeding has been declared constitutional by the Supreme Court of Tennessee. Since that time the city has regained its prosperity, and is now one of the healthiest and most prosperous cities on the river.

MENA, JUAN DE, one of the Italianizing Spanish poets of the fifteenth century, was born at Cordova about 1411. He died suddenly, in consequence of a fall from his mule, in 1456, at Torre Laguna.

MÉNAGE, GILLES, described by Bayle as "one of the most learned men of his time, and the Varro of the seventeenth century," was the son of Guillaume Ménage, king's advocate at Angers, and was born in that city on August 15, 1613. He died at Paris July 23, 1692.

MENANDER, the most famous Greek poet of the New Comedy, which prevailed from about the death of Alexander the Great (323 B.C.) to 250. He was born at Athens in 342, and died, it was said, by drowning in the harbor of that city (Piræus) in 291.

MENCIUS, the Latinized form of Mǎng-tsze, "Mr. Mǎng," or "Mǎng the philosopher," a name in China only second as a moral teacher to that of Confucius. His statue or spirit-tablet (as the case may be) has occupied, in the temples of the sage, since our eleventh century, a place among "the four assessors;" and since 1530 A.D. his title has been "the philosopher Mǎng, sage of the second degree."

The dates of some of the principal events in Mencius' life are fixed by a combination of evidence, and his death is referred by common consent to the year 289 B.C. He had lived to a great age—some say to his eighty-fourth year, placing his birth in 372 B.C., and others to his ninety-seventh, placing it in 385.

We have no accounts of Mencius for many years after his boyhood, and he is more than forty years old when he comes before us as a public character. He must have spent much time in study, investigating the questions which were rife as to fundamental principles of morals and society, and brooding over the condition of the country. The history, the poetry, the institutions, and

the great men of the past had received his careful attention. He intimates that he had been in communication with men who had been disciples of Confucius. That sage had become to him the chief of mortal men, the object of his untiring admiration; and in the doctrines which he had taught Mencius recognized the truth for want of an appreciation of which the bonds of order all around him were being relaxed, and the kingdom hastening to a general anarchy.

Most vivid are the pictures which Mencius gives of the condition of the people in consequence of the wars of the states. "The royal ordinances were violated; the multitudes were oppressed; the supplies of food and drink flowed away like water." It is not wonderful that, when the foundations of government were thus overthrown, speculations should have arisen that threatened to overthrow what he considered to be the foundations of truth and all social order.

On this seething ocean of lawlessness, wickedness, heresies, and misery, Mencius looked out from the quiet of his school, and his spirit was stirred within him to attempt the rescue of the people from the misrule and error. It might be that he would prove the instrument for this purpose. He formed his plan, and proceeded to put it into execution. He would go about among the different kings till he should find one among them who would follow his counsels and commit to him the entire administration of his government. That obtained, he did not doubt that in a few years there would be a kingdom so strong and so good that all rulers would acknowledge its superiority, and the people hasten from all quarters to crown its sovereign as monarch of the whole of China. This plan was much the same as that of Confucius had been; but, with the bolder character that belonged to him, Mencius took in one respect a position from which "the master" would have shrunk. The former was always loyal to Cháu, and thought he could save the country by a reformation; the latter saw the day of Cháu was past, and the time was come for a revolution. Mencius' view was the more correct, but he was not wiser than the sage in forecasting for the future. They could think only of a reformed dynasty or of a changed dynasty, ruling according to the model principles of a feudal constitution, which they described in glowing language. They desired a repetition of the golden age in the remote past; but soon after Mencius disappeared from the stage of life there came the sovereign of Ch'in, and solved the question with fire and sword, introducing the despotic empire which has since prevailed.

MENDELSSOHN, FELIX. Jakob Ludwig Felix Mendelssohn-Bartholdy, one of the greatest composers of this century, was the grandson of Moses Mendelssohn noticed below, and was born in Hamburg on February 3, 1809.

Felix first played in public on October 24, 1818, taking the pianoforte part in a trio by Woelfl. On April 11, 1819, he entered the Berlin Singakademie as an alto, and in the following year began to compose with extraordinary rapidity. His earliest dated work is a cantata, completed on January 13, 1820. During that year alone he produced nearly sixty movements, including songs, pianoforte sonatas, a trio for pianoforte, violin, and violoncello, a sonata for violin and pianoforte, pieces for the organ, and even a little dramatic piece in three scenes. In 1821 he wrote five symphonies for stringed instruments, each in three movements; motets, for four voices; an opera, in one act, called *Soldatenliebschaft*; another, called *Die beiden Pädagogen*; part of a third, called *Die wandernde Comödianten*; and an immense quantity of other music of different kinds, some of which,

thought worthy of publication by the editors of his posthumous works, now stands before the world in evidence of the precocity of his genius.

In 1825 Abraham Mendelssohn took Felix to Paris, where, among other musicians then resident in the French capital, he met the two most popular dramatic composers of the age, Rossini and Meyerbeer, and lived on terms of intimacy with Hummel, Kalkbrenner, Rode, Baillot, Herz, and many other artists of European celebrity. He returned to Berlin with his father in May, 1825.

Soon after his return from Paris, Abraham Mendelssohn removed from his mother's residence to No. 3 Leipziger Strasse. The finished score of the overture to *Midsummer Night's Dream* is dated "Berlin, August 6, 1826"—that is to say, three days after its author had attained the age of seventeen years and a half. The overture was first publicly performed at Stettin, in February, 1827.

Meanwhile *Camacho's Wedding* had been submitted to Herr General-Musik-Director Spontini, with a view to its production at the opera. The work was put into rehearsal soon after the composer's return from Stettin, produced on April 29, 1827, and received with apparent enthusiasm; it never reached a second performance.

In April, 1829, Mendelssohn paid his first visit to London. His reception was most enthusiastic.

The visit to England formed in reality the first division only of a great scheme of travel which his father wished him to extend to all the most important art centers in Europe. After refusing the offer of a professorship at Berlin, he started again, in May, 1830, for Italy, pausing on his way at Weimar, where he spent a memorable fortnight with Goethe, and reaching Rome, after many pleasant interruptions, on November 1st.

In passing through Munich on his return in October, 1831, he composed and played his pianoforte concerto in G minor, and accepted a commission (never fulfilled) to compose an opera for the Munich theater.

On April 23, 1832, he was again in London, where he twice played his G minor concerto at the Philharmonic concerts, gave a performance on the organ at St. Paul's, and published his first book of *Lieder ohne Worte*. He returned to Berlin in July, and during the winter he gave public performances of his Reformation symphony, his concerto in G minor, and his *Walpurgisnacht*. In the following spring he paid a third visit to London for the purpose of conducting his Italian symphony, which was played for the first time, by the Philharmonic Society, on May 13, 1833. On the 26th of the same month he conducted the performances at the Lower Rhine festival at Düsseldorf, with such brilliant effect that he was at once invited to accept the appointment of general-music-director to the town, an office which included the management of the music in the principal churches, at the theater, and at the rooms of two musical associations. This post he willingly accepted, and it formed a stepping-stone to a far more important one.

Before entering upon his new duties, Mendelssohn paid a fourth visit to London, with his father, returning to Düsseldorf on September 27, 1833. There he first designed his famous oratorio *St. Paul*, in response to an application from the Cäcilien-Verein at Frankfort, composed his overture to *Die schöne Melusine*, and planned some other works of importance.

The next great event in Mendelssohn's life was his happy marriage, on March 28, 1837, to Cecile Charlotte Sophie Jeanrenaud, whose amiable disposition, surpassing beauty, and indescribable charm of manner endeared her to all who knew her. The honeymoon was scarcely over before he was again summoned to

England to conduct *St. Paul*, at the Birmingham festival, on September 20th. During this visit he played on the organ at St. Paul's and at Christ Church, Newgate Street, with an effect which exercised a lasting influence upon English organists. It was here also that he first contemplated the production of his second oratorio, *Elijah*.

Passing over the composition of the *Lobgesang* in 1840, a sixth visit to England in the same year, the scheme for the erection of a monument to Sebastian Bach, and other events on which space does not permit us to enlarge, we find Mendelssohn, in 1841, recalled to Berlin by the king of Prussia, with the title of Kapellmeister. Though this appointment resulted in the production of *Antigone*, *Œdipus Coloneus*, *Athalie*, the incidental music to the *Midsummer Night's Dream*, and other great works, it proved an endless source of vexation, and certainly helped to shorten the composer's life. In 1842 he went to England for the seventh time. He returned to his duties at Berlin in September, but happily succeeded in persuading the king to free him from his most onerous engagements, and his delight at this relief was unbounded.

After a brief residence in Frankfort, Mendelssohn returned to Leipsic in September, 1845, resuming his old duties at the Gewandhaus, and teaching regularly in the conservatoire. Here he remained, with little interruption, during the winter—introducing his friend Jenny Lind, then at the height of her popularity, to the critical frequenters of the Gewandhaus, and steadily working at *Elijah*, the first performance of which he conducted at the Birmingham festival, on August 26, 1846. In 1847 he visited England for the tenth and last time. He witnessed Jenny Lind's first appearance at Her Majesty's Theater, on May 4th, and left England on the 9th, little anticipating the trial that awaited him in the tidings of the sudden death of his sister Fanny, which reached him only a few days after his arrival in Frankfort. He fell to the ground insensible, and never fully recovered. He lingered on, now better now worse, through weary weeks, and on November 4th he passed away.

MENDELSSOHN, MOSES, philosopher and scholar, well known as Lessing's friend and the prototype of his "Nathan," was born on September 6, 1729, at Dessau on the Elbe. His numerous writings include *Ueber Evidenz in metaphysischen Wissenschaften* (1763); *Briefe über die Empfindungen* (1764); *Phædon, oder über die Unsterblichkeit der Seele* (1767); *Jerusalem, oder die religiöse Macht und Judenthum* (1783); one or two tracts in Hebrew; and some new German translations from the Old Testament. The controversy which led to the publication of his *Morgenstunden* (1785-86), a reply to Jacobi's *Briefe über die Lehre Spinoza's*, is said to have been more or less directly the cause of his death, which took place on January 4, 1786 (see JACOBI). Of Mendelssohn's three sons, the second, Abraham, settled as a banker in Hamburg and married a Jewess, Lea Salomon Bartholdy, who bore him four children; these, by advice of their mother's brother, himself a conscientious convert from Judaism, were educated as Christians, and thenceforth joined their mother's second surname to their own. The second of them, Felix, is the subject of the preceding notice.

MENDOZA, a city of the Argentine Republic, the only town of the province of Mendoza, lies 700 miles west-northwest of Buenos Ayres, at the foot of the Cordilleras. It was formerly a frequent stopping-place on the route across the Andes by the Uspallata Pass, and used to rank as one of the best-built towns in the country, but in 1861 it was almost completely destroyed by an appalling earthquake, in which the people, for the

most part collected in the churches, perished to the number of about 12,000. Bravard, a French geologist who had often predicted the catastrophe, was one of those who perished.

MENDOZA, DIEGO HURTADO DE, novelist, poet, diplomatist, and historian, was a younger son of the member of the illustrious Mendoza family to whom the government of Granada was intrusted not long after its surrender, and was born in that city about the year 1503. He died at Madrid (which he had obtained leave to visit on some business errand) in April, 1575.

MENDOZA, INIGO LOPEZ DE. See SANTILLANA.

MENELAUS, king of Sparta, was the brother of AGAMEMNON (*q.v.*) and the husband of HELENA, (*q.v.*) He was one of the heroes of the Trojan horse, and recovered his wife at the sack of the city. On the voyage homeward his fleet was scattered off Malea by a storm which drove him to Crete; after seven years' further wandering to Cyprus, Phœnicia, Egypt, Ethiopia, Libya, and the country of the Erembi, he at last had an interview with Proteus and obtained a favorable wind which brought him home on the very day on which Orestes was holding the funeral feast over Ægisthus and Clytæmnestra. After a long and happy life in Lacedæmon, Menelaus, as the son-in-law of Zeus, did not die, but was translated to Elysium.

MENGES, ANTONY RAPHAEL, was the most celebrated representative of the eclectic school of painting in the eighteenth century, and played a great part in the early days of the classic revival. He was born in 1728 at Aussig, in Bohemia. In 1779 he died at Rome.

MENHADEN, economically one of the most important fishes in the United States, known by a great number of local names, "menhaden" and "mossbunker" being those most generally in use. In systematic works it appears under the names of *Clupea menhaden* and *Brevoortia tyrannus*. It is allied to the European species of shad and pilchard, and, like the latter, approaches the coast in its wanderings in immense shoals, which are found throughout the year in some part of the littoral waters between Maine and Florida, the northern shoals retiring into deeper water or to more southern latitudes with the approach of cold weather. The average size of the menhaden is about twelve inches.

MENIN, a small Belgian town, in the province of West Flanders; it is traversed by the river Lys, which there forms the boundary between France and Belgium. The population in 1880 was 10,200.

MENINGITIS, a term in medicine applied to inflammation affecting membranes of the brain (cerebral meningitis) or spinal cord (spinal meningitis) or both.

Of *cerebral meningitis* there are two varieties—(1) that due to the presence of tubercle in the membranes of the brain, which gives rise to the disease known as tubercular meningitis, or acute hydrocephalus; and (2) simple or acute meningitis, which may arise from various causes. Among the more common are injuries of the head, extension of disease from contiguous parts, such as erysipelas of the scalp or caries of the bones of the ear, exposure to cold or to extreme heat, the presence of tumors in the substance of the brain. It may likewise occur in the course of fevers, rheumatism, and inflammatory affections, and also as a result of mental overwork, sleeplessness, and alcoholic excess. This latter variety of meningitis is less common than the former, but it is on the whole more amenable to treatment. The symptoms present such a general resemblance to those already described in tubercular meningitis that it is unnecessary to refer to them in detail (see HYDROCEPHALUS), and the treatment is essentially the same for both.

Spinal meningitis, or inflammation of the membranes

investing the spinal cord, generally results from causes of a similar kind to those producing cerebral meningitis—injuries, exposure to cold or sudden changes of temperature, diseases affecting adjacent parts such as the vertebral column or the spinal cord itself, or extension downward of the inflammation of the membranes of the brain. It is said to be most common in males. As in the case of the brain, the membranes become extremely congested; exudation of lymph and effusion of serum follow; and the spinal cord and roots of the nerves become more or less involved in the morbid process.

The chief symptoms are fever, with severe pain in the back or loins shooting downward into the limbs (which are the seat of frequent painful involuntary startings), accompanied with a feeling of tightness around the body. The local symptoms bear reference to the portion of the cord the membranes of which are involved. Thus when the inflammation is located in the cervical portion the muscles of the arms and chest are spasmodically contracted, and there may be difficulty of swallowing or breathing, or embarrassed heart's action, while when the disease is seated in the lower portion, the lower limbs and the bladder and rectum are the parts affected in this way. At first there is excited sensibility (hyperæsthesia) in the parts of the surface of the body in relation with the portion of cord affected. As the disease advances these symptoms give place to those of partial loss of power in the affected muscles, and also partial anæsthesia. These various phenomena may entirely pass away, and the patient after some weeks or months recover; or, on the other hand, they may increase, and end in permanent paralysis.

The treatment is directed to allaying the pain and inflammatory action by opiates. Ergot of rye is strongly recommended by many physicians. The patient should have perfect rest in the recumbent, or better still in the prone, position. Cold applications to the spine may be of use, while scrupulous attention to the functions of the bladder and bowels, and to the condition of the skin with the view of preventing bed-sores, is all-important.

Epidemic Cerebro-spinal Meningitis.—This name, as well as *cerebro-spinal fever*, is applied to a disease defined in the *Nomenclature of Diseases* as "a malignant epidemic fever, attended by painful contractions of the muscles of the neck and retraction of the head. In certain epidemics it is frequently accompanied by a profuse purpuric eruption, and occasionally by secondary effusions into certain joints. Lesions of the brain and spinal cord are found on dissection." This disease appears to have been first distinctly recognized in the year 1837, when it prevailed as an epidemic in the southwest of France, chiefly among troops in garrison. For several years subsequently it existed in various other localities in France, and mostly among soldiers. At the same time in other countries in western and central Europe the disease was observed in epidemic outbreaks, among both civil and military populations. In 1846 it first showed itself in Ireland, chiefly among the inmates of workhouses in Belfast and Dublin. Numerous outbreaks occurred also about the same period in many parts of the United States. In more recent times the disease has repeatedly appeared in both Europe and America, but it has seldom prevailed extensively in any one tract of country, the outbreaks affecting for the most part limited communities, such as garrisons or camps, schools, workhouses, and prisons.

Little is known regarding the causation of this disease. All ages seem liable to suffer, and, as regards sex, males are affected more commonly than females. Occupation and condition of life appear to exercise no influence. It has been observed to occur most fre-

quently in cold seasons. The question of the contagiousness of cerebro-spinal fever remains still unsettled, but the weight of authority appears to be in favor of the theory of the communicability of the disease. It cannot, however, be regarded as contagious in the same degree as some other specific fevers, such as typhus fever, smallpox, or scarlatina.

The following are the more prominent symptoms:—After a few days of general discomfort the attack comes on sharply with rigors, intense headache, giddiness, and vomiting. Neuralgic pains in the abdomen, and pain with spasmodic contractions in the muscles of the extremities, occur at an early stage. The headache continues with great severity, and restlessness and delirium supervene, accompanied with periods of somnolence. The pains and spasms rapidly increase, the muscles of the neck, spine, and limbs being specially affected. The patient's head is drawn backward and rigidly fixed, the spine arched, and the arms and legs powerfully flexed, the whole condition bearing a considerable resemblance to tetanus. For a time there is greatly increased sensibility of the skin, pain being excited by the slightest contact. There is more or less fever present. About the fourth day of the disease an eruption on the skin both of the face and of the body frequently appears, in the form either of purpuric spots or small, clear vesicles. Death may take place in from a few hours to eight or ten days. Should the patient survive the immediate shock of the attack, serious complications are apt to appear in the form of destructive inflammation of the eyes or ears, inflammation with effusion into certain joints, and paralysis of limbs; or, again, recovery may take place after a prolonged convalescence. The mortality appears to vary in different epidemics, in some being as high as 80 per cent., in others only about 20 per cent. Certain forms of the disease are of malignant character from the first, and very rapidly fatal.

The changes found after death in cerebro-spinal fever are intense inflammation of the membrane of the brain and spinal cord, with effusion of serum or pus into the ventricular and arachnoid spaces.

The treatment is similar to that of other febrile conditions, but for the special symptoms of pain, spasm, etc., opium seems to have been found of eminent service, while quinine and ergot of rye are also recommended.

MENOMINEE, a Michigan town in the county of the same name, of which it is the capital, lies at the mouth of the Menominee River, in the midst of a productive mining and lumbering region. It has banks, telegraphs, railroads, schools, and churches. Its manufactures comprise lumber products, pig-metals, and brewery products. Population (1890), 10,630.

MENNONITES is a name borne by certain Christian communities in Europe and America, denoting their adherence to a type of doctrine of which Menno Simons was, not indeed the originator, but the chief exponent at the time when the anti-pædo-baptism of the congregations in which he labored took permanent form in opposition to ordinary Protestantism on the one hand and to the theocratic ideas of the Münster type of anabaptism on the other. The original home of the views afterward called Mennonite was in Zürich, where, as early as 1525, Grebel and Manz founded a community having for its most distinctive mark baptism upon confession of faith. The chief doctrines of these Zürich Baptists have been already stated in the article BAPTISTS. The main interest of the sect lay not in dogma, but in discipline. Within the communities evangelical life was reduced to a law of separation from the world, and this separation—enforced by a stringent use of excommunication and the prohibition of marriage

beyond the brotherhood—involved not only abstinence from worldly vanities, but refusal of civic duties (the state being held to be un-Christian)—refusal to take an oath or use the sword.

Each community was quite independent, united to the rest only by a bond of love. There was no sort of hierarchy, but only "exhorters" chosen by the congregation, of whom the most prominent were also "elders" intrusted with the administration of the sacraments—an organization so easily kept alive or reproduced that the movement could hardly be checked by any persecution short of the total annihilation which at length was actually the fate of many of the Swiss communities. The remnants of the Swiss Mennonites broke, in 1620, into two parties, the stricter of which, the Ammanites or Upland Mennonites, were distinguished from the Lowland Mennonites by holding that excommunication of one party dissolved marriage, and by their rejection of buttons and the use of the razor. Their persecution lasted till 1710; a few congregations still remain and keep themselves quite distinct from Baptist bodies of more modern origin. In Germany the Mennonites are somewhat more numerous; more important are the German Mennonite colonies in southern Russia, brought thither in 1783 by the empress Catherine, which in turn have recently sent many emigrants to America. America indeed, and especially Pennsylvania, early became a refuge for the Mennonites of Switzerland, the Palatinate, and Holland, and is now the chief home of the body (175,000 in the United States and 25,000 in Canada). The oldest congregation is that of Germantown (since 1683); the most numerous of several divisions are the Old Mennonites, corresponding to the less strict of the Swiss sections.

MENSHIKOFF, ALEXANDER DANILOVICH, born at Moscow on November 17 (O.S.), 1672, was the son of a poor man, who employed him to sell cakes about the streets of that city. In this humble occupation he attracted the attention of Lefort, one of Peter the Great's most active coöperators, who was pleased with his sprightliness, and took him into his service. Peter, soon afterward seeing the youth at Lefort's, was also delighted with him, and took him to be his page. Menshikoff soon became indispensable to the czar, assisting him in his workshop, and displaying signal bravery in the company of his master at the siege of Azoff. He formed one of the suite of Peter during his travels, and worked with him at Saardam and Deptford. Throughout his wars with the Swedes, Menshikoff was the companion of the czar, and greatly distinguished himself. For his gallantry at the battle of the Neva, on May 7 (O.S.), 1703, he received the order of St. Andrew. In 1704 he was made general, and at the request of the czar created a prince of the Holy Roman Empire. On the death of Peter the position of Menshikoff became very perilous; his successes had raised about him a host of enemies eager for his downfall. A chain of events was gradually leading to the downfall of the favorite. His family was banished to Siberia, and arrived at Berezoff toward the end of 1727. Menshikoff's wife died on the journey, and was buried near Kazan. On the arrival of the prisoners they were lodged in a wooden house, consisting of four rooms. But Menshikoff did not long endure the horrors of exile in this inclement region. According to Mannstein, he died (November 12, O.S., 1729) of an apoplectic stroke, because there was no one at Berezoff, as he himself remarked, who understood how to open a vein. The young czar ordered the release from exile of the two remaining children of Menshikoff—his daughter Mary had died at Berezoff in the same year as her father—and restored some of their property to them.

MENSHIKOFF, ALEXANDER SERGEIEVICH, great-grandson of Peter's favorite, born in 1787, entered the Russian service as attaché to the embassy at Vienna. He accompanied the emperor Alexander throughout his campaigns against Napoleon, and attained the rank of general, but retired from active service in 1823. On the outbreak of the Crimean War, he was appointed commander-in-chief, and suffered a severe defeat at the Alma. On the death of the emperor Nicholas in 1855 he was recalled, ostensibly on account of failing health. He died in 1869.

MENSTRUATION, a function of the female of the human species, occurring at intervals of twenty-four to twenty-eight days, and continuing for three to seven days in the healthy subject. The recurrence of the period is marked by a swelling and soreness of the mammæ and a flow of blood from the generative organs. The exact office of the flow has never been satisfactorily determined—one physiologist holding one opinion and another a different view. That it is intimately connected with the reproductive function is certain from the fact that conception is dependent on this exhibition, the regularity of which is of paramount importance as regards the health of a woman. The first appearance of the flow is generally at a period of life between twelve and sixteen years (though in many cases this period varies either way), and it ceases usually between the forty-fifth and fiftieth years of life. Many disorders of the function are observable, in regard to all of which the best advice to be given is at once to place the subject under competent medical care, as more of the usefulness and happiness of a woman is dependent on this bodily function than on any other one incident of life.

MENSURATION, or the art of measuring, involves the construction of measures, the methods of using them, and the investigation of rules by which magnitudes which it may be difficult or impossible to measure directly are calculated from the ascertained value of some associated magnitude. It is usual, however, to employ the term mensuration in the last of these senses; and we may therefore define it to be that department of mathematical science by which the various dimensions of bodies are calculated from the simplest possible measurements.

The determination of the lengths and directions of straight lines, including what are familiarly known as problems in heights and distances, generally depends on the solution of triangles, and belongs to the science of **TRIGONOMETRY** and **SURVEYING**. The remaining portions of the subject are the determinations of the lengths of curves, the areas of plane or other figures, and the volumes and surfaces of solids.

In measuring any magnitude we select some standard or "unit" to measure by. Thus in measuring length we take for unit an inch, a foot, or a yard. From the unit of length we derive the units of area and volume. Thus we define the unit of area to be the area of the square described upon the unit of length, and the unit of volume to be the volume of the cube whose edge is the unit of length or whose side is the unit of area. For example, if an inch be taken as the unit of length, the square whose side is one inch, in the unit of area, and the cube whose edge is one inch is the unit of volume. The length of a line, the area of a surface, and the volume of a solid are then expressed by the numbers, whole or fractional, of units of length, area, and volume which they respectively contain. Hence, if l denote the linear unit, the length of a line which contains a units is al , or simply a since l is unity; similarly the area of a surface which contains b units of area is bm , or simply b , where m is the unit of area.

When two magnitudes have a common measure, that is, when another magnitude can be found which is contained in each an exact number of times, they are said to be "commensurable." If no common measure can be found, the two magnitudes are said to be "incommensurable."

MENTAL DISEASES. See **INSANITY**.

MENTON (Ital., *Mentone*), a cantonal capital in the department of Alpes-Maritimes, France, situated fifteen miles northeast of Nice, on the shores of the Mediterranean.

MENTZ. See **MAINZ**.

MENZEL, WOLFGANG, poet, critic, and historian, was born June 21, 1798, at Waldenburg, in Silesia, studied at Breslau, Jena, and Bonn, and after living for some time in Aarau and Heidelberg finally settled in Stuttgart, where, from 1830 to 1838, he had a seat in the Württemberg "landtag." He died April 23, 1873.

MEPHISTOPHELES, the name of one of the personifications of the principal of evil. The etymology of the word is uncertain. Probably it is of Hebrew origin, which view is supported by the fact that almost all the names of devils in the magic-books of the sixteenth century spring from the Hebrew. In the old Faust legends the character of Mephistopheles is simply that of a powerful and wicked being who fulfills Faust's commands in order to obtain possession of his soul. Marlowe attributes to him a certain dignity and sadness, and there can be little doubt that the Mephistophilis of the *Tragical History* suggested some important traits of Milton's Satan. The name has been made famous chiefly by Goethe, whose conception of the character varied at different periods of his career. In the fragment of *Faust* published in 1790, but written many years before, Mephistopheles has a clearly marked individuality; he is cynical and materialistic, but has a man's delight in activity and adventure, and his magical feats alone remind us that he is preternatural. In revising and extending this fragment, which forms the chief portion of the first part of *Faust*, Goethe treated Mephistopheles as the representative of the evil tendencies of nature, especially of the tendency to denial for its own sake, rather than as a living person.

MEQUINEZ (the Spanish form of the Arabic *Miknāsa*), a town of Morocco, the ordinary residence of the emperor, is situated in a fine hilly country about seventy miles from the west coast and thirty-five west-southwest of Fez, on the road to Salle. In 1880 it had about 30,000 population.

MERAN, a favorite health resort, and the capital of a district in South Tyrol, Austria, is picturesquely situated at the foot of the vine-clad Küchelberg, on the right bank of the Passer, about half a mile above its junction with the Adige, and forty-five miles to the south of Innsbruck.

MERCATOR, GERARDUS (Latinized form of Gerhard Krämer), mathematician and geographer, was born at Rupelmonde, in Flanders, May 5, 1512. Having completed his studies at Louvain, he devoted himself to geography, and, after being for some time attached to the household of Charles V., he was appointed cosmographer to the duke of Juliers and Cleves in 1559, taking up his residence at Duisburg, where he died December 2, 1594.

MERCURIAL AIR-PUMP. This name is given to two distinct instruments, one of which is founded on statical, the other on hydrodynamical principles.

The famous spiritualist Swedenborg was the first to conceive an air-pump in which a mass of mercury, by being made to rise and fall alternately within a vertical vessel, should do the work which in the ordinary instrument is assigned to the piston. He published a

description of his pump in 1722; but it is questionable whether his design was ever realized. Of numerous subsequent inventions the only one which, in fact, has survived is the admirably simple and yet efficient instrument first described in 1858, but constructed some time before, by H. Geisler of Bonn, which at once and justly met with universal acceptance.

The great advantage of the mercurial over the ordinary air-pump is that it evacuates far more completely than the latter, that it affords direct and unmistakable evidence of the exhaustiveness of its work, and—last, not least—that it enables one to transfer the gas sucked out to another vessel without loss or contamination, so that it can be measured and analyzed.

The Dynamic Pump was invented in 1865 by H. Sprengel. The great advantages of Sprengel's pump lie in the simplicity of its construction and in the readiness with which it adapts itself to the collecting of the gas.

MERCURY was the Roman god who presided over barter, trade, and all commercial dealings. His nature is probably more intelligible and simple than that of any other Roman deity. His very name, which is connected with *merx*, *mercator*, etc., shows that he is the god of merchandise and the patron of merchants. In the native Italian states, no merchants and no trade existed till the influence of the Greek colonies on the coast introduced Greek customs into the cities of the land. All the usages and terminology of trade, and all the religious ceremonies connected with it, were borrowed by the Romans from the Greeks. It was no doubt under the rule of the Tarquins, when the prosperity of the state and its intercourse with the outer world were so much increased, that merchants began to ply their trade in Rome. Doubtless the merchants practiced their religious ceremonies from the first, but their god Mercurius was not officially recognized by the state till the year 495 B.C. The Ides of May was chosen as the feast of Mercury, obviously because Maia was the mother of Hermes, *i.e.*, of Mercury (see MAIA); and she was worshiped along with her son by the *mercuriales* on this day.

MERCURY, in chemistry, is a metal (symbol Hg) which is easily distinguished from all others by its being liquid at even the lowest temperatures naturally occurring in moderate climates. To this exceptional property it owes the synonyms of *quicksilver* in English and of *hydrargyrum* (from water and silver) in Græco-Latin.

Mercury occurs in nature chiefly in the form of a red sulphide, called cinnabar, which, as a rule, is accompanied by more or less of the reguline metal—the latter being probably derived from the former by some secondary reaction. The most important mercury mines in Europe are those of Almaden in Spain and of Idria in Illyria; these until lately furnished the bulk of the mercury of commerce, but they are now almost eclipsed by the rich deposits of New Almaden, in California. Considerable quantities of mercury are said to be produced in China and in Japan; minor deposits are being worked in the Bavarian Palatinate, in Hungary, Transylvania, Bohemia, and Peru. At Almaden the ore forms mighty veins traversing micaceous schists of the older transition period; in Illyria it is disseminated in beds of bituminous schists or compact limestone of more recent date.

Chemically speaking, the extraction of mercury from its ores is a simple matter. Metallic mercury is easily volatilized, and separated from the gangue, at temperatures far below redness, and cinnabar at a red heat is readily reduced to the metallic state by the action of iron or lime or atmospheric oxygen, the sulphur being eliminated, in the first case as sulphide of iron, in the second

as sulphide and sulphate of calcium, in the third as sulphurous acid gas.

Commercial mercury, as a rule, is very pure chemically, so that it needs only to be forced through chamois leather to become fit for all ordinary applications; but the metal, having the power of dissolving most ordinary other metals, is very liable to get contaminated with these in the laboratory or workshop, and requires then to be purified.

Mercurial preparations are largely employed as external applications. Several of them are potent agents for the destruction of the lower forms of animal life, and hence are employed to destroy parasites having their habitat in skin, hair, and clothing. The white and red precipitate ointments are specially effective in the destruction of pediculi, and blue ointment is occasionally used for the same purpose. Corrosive sublimate is, however, the most energetic of the mercurial parasitocides, and recent observations seem to show that it is superior to almost all other substances as a germ destroyer. It is sometimes used to get rid of ringworm. It should be remembered that corrosive sublimate is a powerful irritant to the skin, and also an active poison.

Acid nitrate of mercury is a caustic, and by it warts and small growths are sometimes removed; it is also one of the caustics occasionally applied to prevent the spread of lupus.

In skin diseases mercurial preparations are largely used, especially in some forms of eczema. A few grains of the red oxide or of ammoniated mercury in an ounce of zinc ointment are often found of great service in this ailment; citrine ointment is also useful. Calomel ointment is not irritating, but rather tends to soothe. It is therefore sometimes applied to irritable rashes; in *puritus ani* it is of special value. Mercurial preparations are not usually found of benefit in scaly eruptions. In acne a weak solution of corrosive sublimate is often most effective.

Preparations of mercury are often used to heal ulcers, especially those of syphilitic origin. Black wash is one of the commonest applications for this purpose. The red oxide ointment is at times employed to stimulate indolent ulcers, and it is capable of removing exuberant granulations (proud flesh), which sometimes retard the healing of wounds.

Mercury is largely used externally to promote the absorption of inflammatory products, especially in the neighborhood of joints. The blue ointment is frequently employed for this purpose, more rarely a plaster containing mercury or a mercurial liniment. For effecting the absorption of goitre (Derbyshire neck) the ointment of the red iodide is often relied on, especially in India, where it is customary to expose the patient's neck to the sun after rubbing it with the ointment. In enlargements of the liver and spleen the application of mercurial ointment sometimes seems to promote reduction in size.

Taken internally in continued doses, mercury produces a peculiar effect known as salivation. First a metallic taste is experienced; this is followed by soreness of the gums, an undue flow of saliva, and fetor of the breath. Further administration of the drug may increase greatly the salivary flow, and also lead to swelling of the tongue, ulceration of the mouth, and even disease of the jaw-bone. At the same time the blood becomes impoverished, and feverishness with loss of flesh occurs. A single large dose—rarely, too, a single small dose—may produce some of the above symptoms. They may also follow the inhalation of the metal or its compounds, or their absorption through the skin. The long-continued inhalation of the vapor of mercury acts likewise on the nervous system, causing a peculiar kind

of trembling. Mercurial tremor is sometimes seen in looking-glass makers, often in those who work in quick-silver mines.

Internally mercury is chiefly given for two purposes — (1) to check inflammation and cause the absorption of the products it gives rise to, and (2) to antagonize the syphilitic virus and remove the evils it causes. Some years ago the belief in the power of mercury to control inflammation was almost universal, and it was largely administered in almost all inflammatory affections, but of late it has been much less used, both because it seems doubtful whether it has really the power it was once supposed to have and because of the possibility of evil results from its continued use. In peritonitis and iritis it is still often employed, small doses of calomel being given. Not infrequently, too, it is administered in pericarditis and hepatitis, but in pneumonia, pleurisy, and most other inflammatory affections its use is now discarded by many physicians. As an antidote to the syphilitic poison it is still held in high esteem, though opinions vary much as to the extent of its power. There can be little doubt that, given in an early stage of the disorder, it minimizes the secondary symptoms; but it cannot be relied on to prevent their occurrence. It aids in removing the secondary symptoms, and tends to the avoidance of tertiary manifestations, which nevertheless sometimes occur even when mercury has been freely given. The custom of giving mercury till profuse salivation is established has long been abandoned; the aim now is so to give it as to prevent salivation occurring; for this purpose blue pill, calomel, and corrosive sublimate are given in very small doses, but if the gums become tender the dose is decreased or the administration stopped.

Mercurial treatment is sometimes carried out by rubbing the blue ointment into the skin, sometimes by exposing the patient to the fumes of the calomel; syphilitic eruptions are often treated by such fumigation. More rarely mercury is introduced by injecting the albuminate or some other preparation under the skin or by means of suppositories. In children gray powder is generally used when mercurial treatment is required. Children bear mercury well.

Blue pill, calomel, and gray powder are often used as purgatives, and a power of promoting the secretion of bile is attributed to them. Experimentally it has not been proved that they stimulate the liver functions, but there is good reason for believing that they promote the expulsion of bile from the body. Gray powder is especially valued as a mild and efficient aperient for children, and is often given in the early stage of diarrhoea to expel the irritating contents of the bowel.

MERGANSER, a word originating with Gesner in 1555, and for a long while used in English as the general name for a group of fish-eating ducks possessing great diving powers, and forming the genus *Mergus* of Linnæus, now regarded by ornithologists as a sub-family, *Merginæ*, of the family *Anatidæ*. The Mergansers have a long, narrow bill, with a small but evident hook at the tip, and the edges of both mandibles beset by numerous horny denticulations, whence in English the name of "Saw-bill" is frequently applied to them. Otherwise their structure does not much depart from the anatine or fuliguline type. All the species bear a more or less developed crest or tuft on the head. Three of them, *Mergus merganser* or *castor*, *M. serrator*, and *M. albellus*, are found over the northern parts of the Old World, and of these the first two also inhabit North America, which has besides a fourth species, *M. cucullatus*. *M. merganser*, commonly known as the Goosander, is the largest species, being nearly as big as the smaller geese.

Often associated with the Mergansers is the genus

Merganetta, the so-called Torrent-Ducks of South America, of which three species are said to exist; they possess spiny tails and have their wings armed with a spur.

MERGUI, a district of British Burmah, forms the southernmost district of the Tenasserim division, and is bounded on the north by Tavoy, east and south by Siam, and west by the Bay of Bengal, with an area of 7,810 square miles.

MERGUI, chief town of the above district, is situated on an island at the mouth of the Tenasserim river. The population (about 11,000) consists of many races—Talaings, Burmese, Malays, Bengalis, Madrasis, Siamese, and Chinese.

MÉRIDA, a city of 7,390 inhabitants in the province of Badajoz, Spain, lies about thirty-six miles by rail eastward from Badajoz, on the Madrid and Badajoz line, on a small eminence on the right bank of the Guadiana.

MARIDA, the capital of the Mexican State of Yucatan, stands in a great plain in the north of the peninsula, on a surface of limestone rock, about twenty-five miles from the port of Progreso, on the Gulf of Mexico, with which it is connected by a railway opened in 1880. The population, estimated about 1840 as 25,000, was found in 1889 to number 39,000.

MERIDEN, a city of the United States, in New Haven county, Conn., eighteen miles from New Haven by rail. It is a busy manufacturing town; the population had increased from 3,559 in 1850 to 21,652 in 1890. The Britannia Company alone employs upward of 1,000 hands, and sends out every year nearly \$3,000,000 worth of Britannia metal and electroplated goods; and tinware, cutlery, brass-work, flint glass, guns, and woolen goods are also manufactured in the town. The State reform school is located here. A fortified tavern erected by Belcher in 1660, on the road between Boston and New Haven, was the nucleus of Meriden; but the place was not incorporated as a town till 1856, and became a city in 1867.

MERIDIAN, a Mississippi town, in Lauderdale county, of which it is the capital, is a growing community (1890) of 10,624 population. It has banks, churches, two female colleges besides other schools, railroads, telegraphs, etc. It has manufactures of sash, blinds, furniture, etc., and several newspapers are published.

MÉRIMÉE, PROSPER, novelist, archæologist, essayist, and in all these capacities one of the greatest masters of French style during the century, was born at Paris on September 28, 1803, and died at Cannes on the 23d of the same month sixty-seven years later, having lived just long enough to know that ruin was threatening France. In 1825 he published what purported to be the dramatic works of a Spanish lady, Clara Gazul, with a preface stating circumstantially how the supposed translator, one Joseph L'Estrange, had met the gifted poetess at Gibraltar. This was followed by a still more audacious and still more successful *supercherie*. In 1827 appeared a small book entitled *La Guzla* (the anagram of Gazul), and giving itself out as translated from the Illyrian of a certain Hyacinthe Maglanovich. In the next year appeared a short dramatic romance, *La Jacquerie*. This in its turn was followed by a still better piece, *Chronique de Charles IX*. All these works were to a certain extent second hand, being either directly imitated or prompted by a course of reading on a particular subject.

He had already obtained a considerable position in the civil service, and after the revolution of July he was *chef de cabinet* to two different ministers. Mérimée was a born archæologist. He also devoted himself to

history proper during the latter years of the July monarchy, and published numerous essays and works of no great length, chiefly on Spanish, Russian, and ancient Roman history. He did not, however, neglect novel writing during this period, and numerous short tales, almost without exception masterpieces, appeared, chiefly in the *Revue de Paris*. He had been elected to the Academy in 1844, and also to the Academy of Inscriptions, of which he was a prominent member. Between 1840 and 1850 he wrote more tales, the chief of which were *Arsène Guillot* and *Carmen*.

The empire made a considerable difference in Méri-mée's life. He was made a senator, and continued to exercise his archæological functions; but his most important rôle was that of a constant and valued private friend of both the "master and mistress of the house," as he calls the emperor and empress in his letters. He was occasionally charged with a kind of irregular diplomacy, and once, in the matter of the emperor's *César*, he had to pay the penalty frequently exacted from great men of letters by their political or social superiors who are ambitious of literary reputation. But for the most part he was strictly the "ami de la maison." His occupations during the last twenty years of his life were numerous and important, though rather nondescript. He found, however, time for not a few more tales, and for two correspondences, which are not the least of his literary achievements, while they have an extraordinary interest of matter. One of these consists of the letters which have been published as *Lettres à une Inconnue*, the other of the letters addressed to Sir Antonio Panizzi, the late librarian of the British Museum.

MERINO. See SHEEP and WOOL.

MERIONETH, a maritime county of North Wales, is bounded north by Carnarvon and Denbigh, southeast by Denbigh and Montgomery, and west by Cardigan Bay. It is triangular in shape, its greatest length northeast to southwest being forty-five miles, and its greatest breadth northwest to southeast about thirty miles. The area is 385,291 acres, or about 600 square miles.

The climate varies much with the elevation, in some places being bleak and cold, and in others remarkably equable and genial.

According to the agricultural returns for 1882, there were 154,406 acres, or considerably less than half the total area, under cultivation.

Woolen goods are manufactured in various places, especially at Dolgelly. They are principally coarse druggets, kerseymeres, and flannels.

The county returns one member to parliament. There is no municipal or parliamentary borough. The towns returned in 1881 as urban sanitary districts are Bala (1,653), Barmouth (1,512), Dolgelly (2,457), Festiniog (11,272), and Towyn (3,363). Since 1801 the population has nearly doubled. In 1881 it was 54,793, of whom 27,576 were males and 27,217 females.

MERLIN. See FALCON.

MERMAIDS AND MERMEN, in the popular mythology of England and Scotland, are a class of beings more or less completely akin to man, who have their dwelling in the sea, but are capable of living on land and of entering into social relations with men and women. The typical mermaid (who is much more frequently described than the merman) has the head and body of a woman, usually of exceeding loveliness, but below the waist is fashioned like a fish with scales and fins. Her hair is long and beautiful, and she is often represented, like the Russian rusalka, as combing it with one hand while in the other she holds a looking-glass.

In relation to man the mermaid is usually of evil issue if not of evil intent. She has generally to be bribed or compelled to utter her prophecy or bestow her gifts, and whether as wife or paramour she brings disaster in her train. In itself her sea-life is often represented as one of endless delights, but at other times a mournful mystery and sadness broods over it. The fish-tail, which in popular fancy forms the characteristic feature of the mermaid, is really of secondary importance; for the true Teutonic mermaid—probably a remnant of the great cult of the Vanir—had no fish-tail; and this symbolic appendage occurs in such remote mythological regions as to give no clue to historical connection.

Quasi-historical instances of the appearance or capture of mermaids are common enough, and serve, with the frequent use of the figure on signboards and coats of arms, to show how thoroughly the myth had taken hold of the popular imagination.

MEROE, in classical geography, was the metropolis of Æthiopia, situated on an island of the same name between the Nile and the Astaboras (Atbara). The "island" is only an inaccurate name for the fertile plain between the two rivers. This Meroe, first mentioned by Herodotus, succeeded an older Ethiopian kingdom of Napata lower down the Nile, originally subject to and civilized from Egypt, but which afterward became independent and even sent forth an Ethiopian dynasty to reign in Egypt, to which the So and Tirhaka of the Bible belonged (see ETHIOPIA). The name of Meroe in the form Merawi is now given to Napata.

MERSEBURG, the chief town of a district of the same name in the Prussian province of Saxony, is situated on the river Saale, ten miles to the south of Halle and seventeen to the west of Leipsic. It consists of a quaint and irregularly built old town, with two extensive suburbs, and contains six churches and several schools and charitable institutions. Its population in 1880 was 15,205.

Merseburg (*i.e.*, "march-town") is one of the oldest towns in Germany. The great victory gained by the emperor Henry I. over the Huns in 933 is believed to have been fought on the Keuschberg near Merseburg.

MERTHYR TYDFIL, or MERTHYR TYDVIL, a parliamentary borough and market-town of Glamorgan-shire, South Wales, is situated in a bleak and hilly region on the river Taff, and on several railway lines, twenty-five miles north-northwest of Cardiff and thirty east-northeast of Swansea.

MERV, MERU, or MAOUR, a district of Central Asia, situated on the border-land of Iran and Turan. The oasis of Merv lies in the midst of a desert. It is about 250 miles from Herat, 170 from Charjui on the Oxus, 360 from Khiva, and 175 from Gawars, the nearest point in the Russian territory of Akhal.

Whether as a satrapy of Darius and subsequently as a province of Alexander, whether as the home of the Parthian race, whether as a bulwark against the destructive waves of Mongol invasion, or later as the glaxis of Persian Khorasan, the valleys of those rivers—the district of Merv—have ever been important outposts on the borders of Iran. In bygone epochs their banks have, under powerful rulers, been studded with populous and flourishing cities, which bore the name of "Sovereign of the Universe," and vied for fame with "Balkh, the Mother of cities;" of late times, with weakness or absence of government, those same banks have become choked with fallen battlements and ruins, the home of the snake and the jackal.

The present inhabitants of the district are Turcomans of the Tekke tribe, who, like the other tribes inhabiting Turcomania, enjoyed, until the approach of the Russians, virtual independence, and acknowledged allegi-

ance to no one—a pastoral people who eked out a miserable existence by the trade of passing caravans, and in bad times pillaged the neighboring and equally barbarous states, to whose reprisals they were in turn subjected.

From the year 1869, the date of the establishment of the Russian military settlement at Krasnovodsk on the east shore of the Caspian, the wave of Russian conquest has gradually swept eastward along the northern frontier of Persia until it has for the moment stopped at the outermost border of the Akhal Turcoman country, which was incorporated in 1881 by Russia as the result of the defeat of that tribe at Geok Tepe. Among the districts still further east, to which the Russians give the name of Eastern Turcomania, is that of the Merv Tekke Turcomans, kinsmen of the Akhal Tekkes, the most recent of Russia's subjects. The district of the Merv Tekkes may be taken to be that included between the lower Murghab below Yulutan, where the river enters the plain, and the Persian frontier from Sarakhs to Gawars.

A reference to the map will show the strategical importance of this district, situated at the point of meeting of two lines, of which one is the strategic line of Russian advance on Herat from Krasnovodsk to Sarakhs, and the other the strategic line of advance on the same place from Tashkend through Bokhara. The capital of the district is, moreover, the crossing-point of the Herat-Khiva and Meshed-Bokhara trade routes.

Consequently this district, a solitary oasis in a vast desert, guarantees to its possessor the command of an important avenue between north and south, and, in the event of its falling into Russian hands, will give that power in addition a valuable link in the chain of connection between her recent acquisitions on the Persian frontier and those in Turkestan, the forging of which has been persistently advocated by Russian writers for years past. One of these, Colonel Veniukoff, frankly admits that it is the political results—"the consolidation of friendly relations with the Turcomans"—and not commercial interests merely, that are primarily looked to, and openly states that the forward movement in Central Asia "cannot end otherwise than by the annexation to Russia of the whole of Turan."

Whether by design or by the force of circumstances, the recommendations of those writers have been translated into facts, and Russia with her advanced post at Askabad is now within 400 miles of Herat, which Sir Henry Rawlinson designates as the key of India. The occupation of the Merv Tekke country would bring Russia to within 250 miles of Herat. From Askabad she is in connection with the Caspian by a good line of communication, part of which (from the sea to Kizil Arvat) is by rail; and hence facilities are offered for bringing up not only the resources of the Caucasus but of the whole of European Russia. While Russian troops are within 400 miles of Herat, the British troops at Quetta are more than 500 miles from Herat.

These remarks serve to explain the very natural suspicion with which Great Britain has regarded the occupation one after another of important strategical points along that route by which alone Russia can strike at India—the same line by which Napoleon meditated a Russo-French invasion in the early part of this century.

MÉRYON, CHARLES. The name of Méryon is associated with that spirited revival of etching in France which took place in the middle of the nineteenth century—say from 1850 to 1865—but it is rather by the individuality of his own achievements, and the strength of his artistic nature, than by the influence he exercised that Méryon best deserves fame.

Charles Méryon was born in Paris in 1821. Having

proved himself a surprising copyist, he proceeded to labor of his own, and began that series of etchings which are the greatest embodiments of his greatest conceptions—the series called "Eaux-fortes sur Paris." These plates, executed from 1850 to 1854, are never to be met with as a set; they were never expressly published as a set.

Besides the twenty-two etchings "sur Paris," Méryon did seventy-two etchings of one sort and another—ninety-four in all being catalogued in Wedmore's *Méryon and Méryon's Paris*. A very few years after the completion of his Paris series, he was lodged in the madhouse of Charenton. Its order and care restored him for awhile to health, and he came out and did a little more work, but at bottom he was exhausted. In 1867 he returned to his asylum, and died there in 1868.

MESCHERYAKS, or MESCHERS, a people inhabiting Eastern Russia. Nestor regarded them as Finns, and even now part of the Mordvinians (of Finnish origin) call themselves Meschers. Klaproth, on the other hand, supposed they were a mixture of Finns and Turks, and the Hungarian traveler Regulí discovered that the Tartarized Meschers of the Obi closely resembled Hungarians. They formerly occupied the basin of the Oka (where the town Meschersk, now Meschovsk, has maintained their name) and of the Sura, extending north-east to the Volga. After the conquest of the Kazan empire by Russia, part of them migrated northeastward to the basins of the Kama and Byelaya, and thus the Meschers divided into two branches. The western branch became Russified, so that the Mescheryaks of the governments of Penza, Saratoff, Ryazan, and Vladimir have adopted the customs, language, and religion of the conquering race; but their ethnographical characteristics can be easily distinguished in the Russian population of the governments of Penza and Tamboff. The eastern branch has taken on the customs, language, and religion of Bashkirs, with whom their fusion is still more complete. They can be distinguished from their neighbors only by their more peaceful character.

MESCHOVSK, a district town of Russia, in the government of Kaluga, forty-five miles to the southwest of the capital of the province.

MESHÉD (properly Mesh-hed, *i.e.*, "place of martyrdom," "shrine"), a city of northern Persia, capital of Khorásán, 472 miles east of Tehrán, 201 miles northwest of Herat, lies on a plain watered by the Keshaf-rúd, a tributary of the Heri-rúd, and is surrounded by mud walls four miles in circumference, with a dry ditch forty feet deep at some points, which could be flooded from the neighboring reservoir and water-courses. Within this inclosure is a strong citadel, with good walls twenty-five feet high, residence of the prince governor of Khorásán. Population, 95,000.

MESHED-ALI, i.e., the shrine of the "martyr" Ali, is a town of Asiatic Turkey, province of Bagdad, fifty miles south of Kerbela, close to the ruins of Kufa, and two miles west of the Hindiye branch of the Euphrates, the reputed burial-place of the caliph Ali. It stands on the east scarp of the Syrian desert, and is inclosed by nearly square brick walls flanked by massive round towers dating from the time of the caliphs. Under the gilded dome of the great mosque, which occupies the center of the town, is the shrine of Ali, which is held by the Shí'a as at least as holy as the Kaaba itself. Any Moslem buried within sight of the dome being certain of salvation, large numbers of bodies are yearly sent from all parts for interment here.

MESHED HOSEIN, properly MESHED HOSEIN. See **KERBELA**.

MESMER, MESMERISM. See **MAGNETISM**.

MESOPOTAMIA, the "country between the rivers,"

is a purely geographical expression, the countries which it comprehends never having formed a self-contained political unity. It was first introduced by the Greeks at or after the time of Alexander, but probably had its origin in the earlier Aramæan name *bêth nahrîn* (the country between the rivers), to which again corresponds the Biblical *Aram Naharayim*. As early as 700 B.C. "the country of two rivers" is mentioned on the Egyptian monuments under the name Naharina, but no such designation appears in the cuneiform inscriptions (though the territory formed part of the Assyrian as it afterward did of the Persian empire). The most settled period in the history of Mesopotamia was probably under Persian-Greek rule. Xenophon applies the name Syria to the extremely fertile district which he traversed after having crossed the Euphrates at Thapsacus. The country beyond the Araxes he calls Arabia—a desert region in which his army had to suffer great hardships until it reached the "gates of Arabia." Even in later times Mesopotamia was included under the name Assyria, or was reckoned part of Babylonia.

It appears that Mesopotamia reaches its northern limits at a point where the EUPHRATES (*q.v.*) and the Tigris break through the mountain range and enter the lowlands. In the case of the Euphrates this takes place at Sumeisât (Samosata), and that of the Tigris near Jezîret ibn 'Omar (Bezabdá) and Mosul (Nineveh). Consequently the irregular northern boundaries are marked by the lowland limits of those spurs of the Taurus mountains known in antiquity as Mons Masius and now as Karaje Dágh and Túr 'Abdín. Toward the south the ancient boundary was the so-called Median Wall, which, near Pirux Shapur, not much to the south of Hí (the ancient Is), crossed from the Euphrates in the direction of Kadisiya (Opis) to the Tigris. There the two rivers approach each other, to diverge again lower down. At the same place begins the network of canals connecting the two rivers which rendered the country of Babylonia one of the richest in the world; there, too, in a geological sense, the higher portion of the plain, consisting of strata of gypsum and marl, comes to an end; there at one time ran the line of the sea-coast; and there begin those alluvial formations with which the mighty rivers in the course of long ages have filled up this depressed area. Mesopotamia thus forms a triangle lying in the northwest and southeast direction, with its long sides toward the north and southwest, and has an area of some 55,200 square miles.

The south or steppe portion of Mesopotamia was from early times the roaming-ground of Arabic tribes; for Xenophon gives the name of Arabia to the district on the left bank of the Euphrates to the west of the Khábúr; and elsewhere it is frequently stated that the interior at a distance from the rivers was a steppe inhabited by Arabes Scenitæ (Tent Arabs).

It appears that Mesopotamia, like Syria, constitutes an intermediate territory between the great eastern and western monarchies—Syria inclining more to the west, and Mesopotamia to the east. In virtue of its position it frequently formed both the object and the scene of contest between the armies of those mighty monarchies, and it is wonderful how a country so often devastated almost always recovered. The roads, it is true, which traversed the territory were not mere military highways, but the main routes of traffic for Central Asia, Western Asia, and Europe. It is only in modern times, and since these lines of commercial intercourse have ceased to be followed, that the general condition of things has been so entirely altered.

MESSENE, the chief city of Messenia, founded, under the auspices of Epaminondas, as a bulwark against the Spartans. After the battle of Leuctra that

general sent to all the exiled Messenians—in Africa, Sicily, or Italy—and invited them to return to the land of their fathers. Many came with eagerness, and in 369 B.C. the city was built by the combined army of Thebans under Epaminondas and Argives under Epitales, assisted by the Messenians themselves. The site was chosen in conformity with a vision which appeared to Epaminondas, and the walls were raised to the sound of flutes playing the airs of Sacadas and Pronomus. The citadel was erected on the summit of Mount Ithome, and the city on its southern slope and in the adjoining valley.

MESSENIA (in Homer Messene), a state of Greece, and most westerly of the three peninsulas of the Peloponnesus. Its area is a little over 1,160 square miles. It is separated from Elis and Arcadia on the north by the Neda and the Nomian mountains, and from Laconia on the east by the lofty range of Taygetus. The other sides are washed by the sea, which indents its shores with four gulfs or bays—Messenia, Phœnicus, Pylus, and Cyparissus.

The earliest inhabitants of Messenia were Leleges, whose capital was at Andania. After these came Ætolians, whose chief center was at Pylus. After the Dorian conquest the country was divided by Cresphontes into five parts, whose chief cities were respectively Stenyclarus, Pylus, Rhion, Hyamia, and Mesola. The towns of Messenia were not numerous.

MESSIAH and MESSIAS, are transcriptions of the Greek, which in turn represents the Aramaic *mēshîhâ*, answering to the Hebrew, "the anointed." The Hebrew word with the article prefixed occurs in the Old Testament only in the phrase, "the anointed priest," but "Jehovah's anointed" is a common title of the king of Israel, applied in the historical books to Saul and David, in Lam. iv. 20, to Zedekia, and in Isa. xlv. 1 extended to Cyrus. In the Psalms corresponding phrases (My, Thy, His anointed) occur nine times, to which may be added the lyrical passages 1 Sam. ii. 10, Hab. iii. 13.

The hope of the advent of an ideal king was only one feature of that larger hope of the salvation of Israel from all evils, the realization of perfect reconciliation with Jehovah, and the felicity of the righteous in Him, in a new order of things free from the assaults of hostile nations and the troubling of the wicked within the Hebrew community, which was constantly held forth by all the prophets, from the time when the great seers of the eighth century B.C. first proclaimed that the true conception of Jehovah's relation to His people was altogether different from what was realized, or even aimed at, by the recognized civil and religious leaders of the two Hebrew kingdoms, and that it could become a practical reality only through a great deliverance following a sifting judgment of the most terrible kind. The idea of a judgment so severe as to render possible an entire breach with the guilty past, and of a subsequent complete realization of Jehovah's kingship in a regenerate nation, is common to all the prophets, but is expressed in a great variety of forms and images, conditioned by the present situation and needs of Israel at the time when each prophet spoke. As a rule the prophets directly connect the final restoration with the removal of the sins of their own age, and with the accomplishment of such a work of judgment as lies within their own horizon; to Isaiah the last troubles are those of Assyrian invasion, to Jeremiah the restoration follows on the exile to Babylon; Daniel connects the future glory with the overthrow of the Greek monarchy. The details of the prophetic pictures show a corresponding variation; but all agree in giving the central place to the realization of a real effective kingship of Jehovah; in fact the conception of the religious subject as the

nation of Israel, with a national organization under Jehovah as king, is common to the whole Old Testament, and forms the bond that connects prophecy proper with the so-called Messianic psalms and similar passages which theologians call typical, *i.e.*, with such passages as speak of the religious relations of the Hebrew commonwealth, the religious meaning of national institutions, and so necessarily contain ideal elements reaching beyond the empirical present. All such passages are frequently called Messianic; but the term is more properly reserved as the specific designation of one particular branch of the Hebrew hope of salvation, which, becoming prominent in post-canonical Judaism, used the name of the Messiah as a technical term (which it never is in the Old Testament), and exercised a great influence on New Testament thought—the term “the Christ” being itself nothing more than the translation of “the Messiah.”

MESSINA, a city and seaport at the northeast corner of Sicily, capital of the province of the same name, is situated on the Straits of Messina (at this point about four miles wide), eight miles northwest of Reggio and 130 miles east by north of Palermo. The town is built between the sea and a range of sharp and rugged hills, called the Dinnamare, 3,707 feet at their highest point. It runs in a semicircle around the harbor, and presents a picturesque appearance from the sea, as the houses rise in tiers upon the slope of a hill, and behind are the wooded mountains.

Messina is the second town of Sicily in importance and in size. Its population was 97,074 in 1850, 111,854 in 1871, and 126,497 in 1881. It is an archiepiscopal see, and has a university, founded by the Jesuits in 1548, with a public library of 56,000 volumes.

The history of Messina begins very early. It is said to have been founded on the site of a more ancient Sicilian town, by pirates from Cumæ, in 732 B.C.

METALLURGY, a branch of applied science whose object is to describe and scientifically criticise the methods used industrially for the extraction of metals from their ores. Of the large number of metals enumerated in the handbooks of chemistry, the vast majority, of course, lie outside its range; but it is perhaps as well to point out that in metallurgic discussion even the term “metallic,” as applied to compounds, has a restricted meaning, being exclusive of all the light metals, although one of these, namely aluminium, is being manufactured industrially. The history of metallurgy, up to the most recent times, is obscure. It is only since about the beginning of this century that the art has come to be at all scientifically criticised; and in the case of the most important processes all that science has been able to do has been merely to put her stamp upon what experience has long found to be right. Great and brilliantly successful scientific efforts in the synthetic line are not wanting, but they all belong to recent times. Science, by its very nature, aims at publicity; empiricism at all times has done the reverse; hence a history of the development of the art of metallurgy does not and cannot exist. A few historical notes on the discovery of certain of the useful metals are given in the introduction to METALS (*q.v.*)

Occasionally metallic ores present themselves in the shape of practically pure compact masses, from which the accompanying matrix or “gangue” can be detached by hand and hammer. But this is a rare exception. In most cases the “ore,” as it comes out of the mine, is simply a mixture of ore proper and gangue, in which the latter not infrequently predominates so much that it is not the gangue but the ore that really occupies the position of what the chemist would call the impurity. Hence, in general, it is necessary, or at least expedient,

to purify the ore as such before the liberation of the metal is attempted. Most metallic ores are specifically heavier than the impurities accompanying them, and their purification may be (and generally is) effected by reducing the crude ore to a fine enough powder to detach the metallic from the earthy part, and then washing away the latter by a current of water, as far as possible. In the case of a “reguline” ore, such as auriferous quartz, for instance, the ore thus concentrated may consist substantially of the metal itself, and require only to be melted down and cast into ingots to be ready for the market. This, however, is a rare case, the vast majority of ores being chemical compounds, which for the extraction of their metals demand chemical treatment. The chemical operations involved may be classified as follows:—

Fiery Operations.—The ore, along in general with some kind of “flux,” is exposed to the direct action of a powerful fire. The fire in most cases has a chemical, in addition to its obvious physical function. It is intended either to burn away certain components of the ore—in which case it must be so regulated as to contain a sufficient excess of unburned oxygen; or it is meant to deoxidize (“reduce”) the ore, when the draught must be restricted so as to keep the ore constantly wrapped up in combustible flame gases, (carbonic oxide, hydrogen, marsh-gas, etc.) The vast majority of the chemical operations of metallurgy fall into this category, and in these processes other metal-reducing agents than those naturally contained in the fire (or wind) are only exceptionally employed.

Amalgamation.—The ore by itself (if it happens to be a reguline one), or the ore plus certain reagents (if it does not), is worked up with mercury so that the metal is obtained ultimately as an amalgam, which can be separated mechanically from the dross. The purified amalgam is subjected to distillation, when the mercury is recovered as a distillate while the metal remains.

Wet Processes.—Strictly speaking, certain amalgamation methods fall under this head; but, in its ordinary acceptance, the term refers to processes in which the metal is extracted either from the natural ore, or from the ore as it is after roasting or some other preliminary treatment, by means of an aqueous acid or salt solution, and from this solution precipitated—generally in the reguline form—by some suitable reagent.

Few methods of metal extraction at once yield a pure product. What as a rule is obtained is a more or less impure metal, which requires to be “refined” to become fit for the market.

METALS. The earliest evidence of a knowledge and use of metals is found in the prehistoric implements of the so-called Bronze and Iron ages. In the earliest periods of written history, however, we meet with a number of metals in addition to these two. The Old Testament mentions six metals—gold, silver, copper, iron, tin, and lead. The Greeks, in addition to these and to bronze, came also to know mercury; and the same set of metals, without additions, forms the list of the Arabian chemists of the eighth and of the Western chemists of the thirteenth century. During the fifteenth century Basilius Valentinus discovered antimony; he also speaks of zinc and bismuth, but their individuality was established only at a later period. About 1730–40 the Swede Brand discovered arsenic and cobalt (the former is not reckoned a metal by modern chemists), while the Englishman Ward recognized the individuality of platinum. Nickel was discovered in 1774 by Cronstedt, manganese in 1774 by Scheele. The brothers d’Elhujart, 1783, prepared tungsten; Hjelm, in 1782, isolated molybdenum from molybdic oxide, where its existence had been conjecturally asserted by Berg-

mann in 1781. Uranium, as a new element, was discovered by Klaproth in 1789; but his metallic "uranium," after having been accepted as a metal by all chemists until 1841, was then recognized as an oxide by Péligot, who subsequently isolated the true metal. Tellurium was discovered by Müller von Reichenbach in 1782 (again by Klaproth in 1798); titanium, by Klaproth in 1795; chromium, by Vauquelin in 1797; tantalum, by Hatchett in 1801, and by Ekeberg in 1802. Palladium, rhodium, iridium, and osmium (which four metals always accompany platinum in its ores) were discovered, the first two by Wollaston in 1803, the other two by a number of chemists; but their peculiarity was established chiefly by Smithson Tennant.

After Davy, in 1807 and 1808, had recognized the alkalis and alkaline earths as metallic oxides, the existence of metals in all basic earths became a foregone conclusion, which was verified sooner or later in all cases. But the discovery of aluminium by Wöhler in 1828, and that of magnesium by Bussy in 1829, claim special mention. Cadmium, a by no means rare heavy metal, was discovered only in 1818 by Stromeyer.

Of the large number of discoveries of rare metals which have been made in the more recent times only a few can be mentioned as marking new departures in research or offering other special points of interest. In 1861 Bunsen and Kirchhoff, by means of the method of spectrum analysis, which they had worked out shortly before, discovered two new alkali-metals which they called *cæsium* and *rubidium*. By means of the same method Crookes, in 1861, discovered *thallium*; Reich and Richter, in 1863, *indium*; and Lecoq de Boisbaudran, in 1875, *gallium*. The existence of the last-named metal had been maintained, theoretically, by Mendelejeff, as early as 1871. The existence of *vanadium* was proved in 1830 by Sefström; but what he, and subsequently Berzelius, looked upon as the element was, in 1867, proved to be really an oxide by Roscoe, who also succeeded in isolating the true metal.

The development of earlier notions on the constitution of metals and their genetic relation to one another forms the most interesting chapter in the history of chemistry (see *ALCHEMY*). What modern science has to say on the subject is easily stated: all metals properly so called (*i.e.*, all metals not alloys) are elementary substances; hence chemically speaking, they are not "constituted" at all, and no two can be related to each other genetically in any way whatever. Our scientific instinct shrinks from embracing this proposition as final; but in the meantime it must be accepted as correctly formulating our ignorance on the subject. All metallic elements agree in this, that they form at least one basic oxide, or, what comes to the same thing, one chloride, stable in opposition to liquid water. This at once suggests an obvious definition of metals as a class of substances, but the definition would be highly artificial and objectionable on principle, because when we speak of metals we think, not of their accidental chemical relations, but of a certain sum of mechanical and physical properties which unites them all into one natural family. What these properties are we shall now endeavor to explain.

All metals, when exposed in an inert atmosphere to a sufficient temperature, assume the form of liquids, which all present the following characteristic properties:—They are (at least practically) non-transparent; they reflect light in a peculiar manner, producing what is called "metallic luster." When kept in non-metallic vessels they take the shape of a convex meniscus. These liquids, when exposed to higher temperature, some sooner, others later, pass into vapors. What these vapors are like is not known in many cases, since, as a rule, they can be

produced only at very high temperatures, precluding the use of transparent vessels. Silver vapor is blue, potassium vapor is green, many others (mercury vapor, for instance) are colorless. The liquid metals, when cooled down sufficiently, some at lower, others at higher temperatures, freeze into compact solids, endowed with the (relative) non-transparency and the luster of their liquids. These frozen metals in general form compact masses consisting of aggregates of crystals belonging to the regular or rhombic or (more rarely) the quadratic system. But in many cases the crystals are so closely packed as to produce an apparent absence of all structure. Compared with non-metallic solids, they in general are good conductors of heat and of electricity. But their most characteristic, though not perhaps their most general, property is that they combine in themselves the apparently incompatible properties of elasticity and rigidity on the one hand and plasticity on the other. To this remarkable combination of properties more than to anything else the ordinary metals owe their wide application in the mechanical arts. In former times a high specific gravity used to be quoted as one of the characteristics of the genus; but this no longer holds, since we have come to know of a whole series of metals which float on water. Let us now proceed to see to what degree the mechanical and physical properties of the genus are developed in the several individual metals.

Non-Transparency.—This, in the case of even the solid metals, is perhaps only a very low degree of transparency. In regard to gold this has been proved to be so; gold leaf, or thin films of gold produced chemically on glass plates, transmit light with a green color. On the other hand, those infinitely thin films of silver which can be produced chemically on glass surfaces are absolutely opaque. Very thin films of liquid mercury, according to Melsens, transmit light with a violet-blue color; also thin films of copper are said to be translucent. Other metals, so far as we know, have not been more exactly investigated in this direction.

Color.—Gold is yellow; copper is red; silver, tin, and some others are pure white; the majority exhibit some modification or other of gray.

Reflection of Light.—Polished metallic surfaces, like those of other solids, divide any incident ray into two parts, of which one is refracted while the other is reflected—with this difference, however, that the former is completely absorbed, and the latter, in regard to polarization, is quite differently affected. The degree of absorption is different for different metals.

Crystalline Form.—Most (perhaps all) metals are capable of crystallization, and in most cases isolated crystals can be produced by judiciously managed partial freezing.

Structure.—Perhaps all metals, in the shape which they assume in freezing, are crystalline, only the degree of visibility of the crystalline arrangement is very different in different metals, and even in the same metal varies according to the slowness of solidification and other circumstances.

Closely related to the structure of metals is their degree of "plasticity" (susceptibility of being constrained into new forms without breach of continuity). This term of course includes as special cases the qualities of "malleability" (capability of being flattened out under the hammer) and "ductility" (capability of being drawn into wire); but it is well at once to point out that these two special qualities do not always go parallel to each other, for this reason among others that ductility in a higher degree than malleability is determined by the tenacity of a metal. Hence tin and lead, though very malleable, are little ductile. The quality of plasticity is developed to very different degrees in dif-

ferent metals, and even in the same species it depends on temperature, and may be modified by mechanical or physical operations.

What we have called plasticity must not be mixed up with the notion of softness, which means the degree of facility with which the plasticity of a metal can be discounted.

Elasticity.—All metals are elastic to this extent, that a change of form, brought about by stresses not exceeding certain limit values, will disappear on the stress being removed. Strains exceeding the "limit of elasticity" result in permanent deformation or (if sufficiently great) in rupture.

Color.—Most metals are white or gray; so are the alloys of these metals with one another. Gold alloys generally exhibit something like the shade of yellow which one would expect from their composition; its amalgams, however, are all white, not yellow. Copper shows little tendency to impart its characteristic red color to its alloys with white or gray metals. Thus, for instance, the silver alloy up to about 30 per cent. of copper exhibits an almost pure white color. The alloys of copper with zinc (brass) or tin (bronze) are reddish-yellow when the copper predominates largely. As the proportion of white metal increases, the color passes successively into dark yellow, pale yellow, and ultimately into white. Aluminium bronze, containing from 5 to 10 per cent. of aluminium, is golden-yellow.

Plasticity.—This quality is most highly developed in certain pure metals, notably in gold, platinum, silver, and copper. Of platinum alloys little is known. The other three, on uniting with one another, substantially retain their plasticities, but the addition of any metal outside the group leads to deterioration. Thus, for instance, according to Karsten, copper by being alloyed with as little as 0.6 per cent. of zinc, loses its capability of being forged at a red heat; it cracks under the hammer. Antimony or arsenic to the extent of 0.15 per cent. renders it unfit for being rolled into thin sheet or drawn out into fine wire, and makes it brittle in the heat; 0.1 per cent. of lead prohibits its conversion into leaf.

Hardness, Elasticity, Tensile Strength.—In reference to these qualities, we shall confine ourselves to some very striking changes for the better which the metals, (1) gold, (2) silver, (3) copper, suffer when alloyed with moderate proportions (10 per cent. or so) of (1) copper, (2) copper, (3) tin, zinc, or aluminium respectively. Any of these five combinations leads to a considerable increase in the three qualities named, although these are by no means highly developed in the added metals; most strikingly it does so in the case of aluminium bronze (copper and aluminium), which is so hard as to be very difficult to file, and is said to be equal in tensile strength to wrought iron.

Hydrogen, as was shown by Graham, is capable of uniting with (always very large proportions of) certain metals, notably with palladium, into metal-like compounds. But those hydrogen alloys, being devoid of metallurgic interest, fall better under the heading **PALLADIUM**.

Oxygen.—Mercury and copper (perhaps also other metals) are capable of dissolving their own oxides with formation of alloys. Mercury, by doing so, becomes viscid and unfit for its ordinary applications. Copper, when pure to start with, suffers considerable deterioration in plasticity. But the presence of moderate proportions of cuprous oxide has been found to correct the evil influence of small contaminations by arsenic, antimony, lead, and other foreign metals. Most commercial coppers owe their good qualities to this compensating influence.

Arsenic combines readily with all metals into true arsenides, which latter, in general, are soluble in the metal itself. The presence in a metal of even small proportions of arsenide generally leads to considerable deterioration in mechanical qualities.

Phosphorus.—The remark just made might be said to hold for phosphorus were it not for the existence of what is called "phosphorus-bronze," an alloy of copper with phosphorus (*i.e.*, its own phosphide), which possesses valuable properties. According to Abel, the most favorable effect is produced by from 1 to 1½ per cent. of phosphorus. Such an alloy can be cast like ordinary bronze, but excels the latter in hardness, elasticity, toughness, and tensile strength. (See **PHOSPHORUS**.)

Carbon.—Most metals when in a molten state are capable of dissolving at least small proportions of carbon, which, in general, leads to a deterioration in metallicity, except in the case of iron, which by the addition of small percentages of carbon gains in elasticity and tensile strength with little loss of plasticity (see **IRON**).

Silicon, so far as we know, behaves to metals pretty much like carbon, but our knowledge of facts is limited. What is known as "cast iron" is essentially an alloy of iron proper with 2 to 6 per cent. of carbon and more or less of silicon (see **IRON**). Alloys of copper and silicon were prepared by Deville in 1863. The alloy with 12 per cent. of silicon is white, hard, and brittle. When diluted down to 4.8 per cent., it assumes the color and fusibility of bronze, but, unlike it, is tenacious and ductile like iron.

METAL WORK. Among the many stages in the development of primeval man, none can have been of greater moment in his struggle for existence than the discovery of the metals, and the means of working them. The names generally given to the three prehistoric periods of man's life on the earth—the Stone, the Bronze, and the Iron age—imply the vast importance of the progressive steps from the flint knife to the bronze celt, and lastly to the keen-edged, elastic iron weapon or tool. The length of time during which each of these ages lasted must of course have been different in every country and race in the world. The Digger Indians of South California have even now not progressed beyond the Stone Age; while some of the tribes of Central Africa are acquainted with the use of copper and bronze, though they are unable to smelt or work iron.

The metals chiefly used have been gold, silver, copper and tin (the last two generally mixed, forming an alloy called bronze), iron, and lead. The peculiarities of these various metals have naturally marked out each of them for special uses and methods of treatment. The durability and the extraordinary ductility and pliancy of gold, its power of being subdivided, drawn out, or flattened into wire or leaf of almost infinite fineness, have led to its being used for work where great minuteness and delicacy of execution were required; while its beauty and rarity have, for the most part, limited its use to objects of adornment and luxury, as distinct from those of utility. In a lesser degree most of the qualities of gold are shared by silver, and consequently the treatment of these two metals has always been very similar, though the greater abundance of the latter metal has allowed it to be used on a larger scale and for a greater variety of purposes.

Bronze is an alloy of copper and tin in varying proportions, the proportion of tin being from 8 to 20 per cent. The great fluidity of bronze when melted, the slightness of its contraction on solidifying, together with its density and hardness, make it especially suitable for casting, and allow of its taking the impress of the mold with extreme sharpness and delicacy. In

the form of plate it can be tempered and annealed till its elasticity and toughness are much increased, and it can then be formed into almost any shape under the hammer and punch.

In modern times, after the discovery of zinc, an alloy of copper and zinc called brass has been much used, chiefly for the sake of its cheapness as compared with bronze. In beauty, durability, and delicacy of surface it is very inferior to bronze, and, though of some commercial importance, has been but of little use in the production of works of art.

To some extent copper was used in an almost pure state during mediæval times, especially from the twelfth to the fifteenth century, mainly for objects of ecclesiastical use, such as pyxes, monstrances, reliquaries, and croziers, partly on account of its softness under the tool, and also because it was slightly easier to apply enamel and gilding to pure copper than to bronze. In the mediæval period it was used to some extent in the shape of thin sheeting for roofs, as at St. Mark's, Venice; while during the sixteenth and seventeenth centuries it was largely employed for ornamental domestic vessels of various sorts.

The abundance in which iron is found in so many places, its great strength, its remarkable ductility and malleability in a red-hot state, and the ease with which two heated surfaces of iron can be welded together under the hammer combine to make it specially suitable for works on a large scale where strength with lightness are required—things such as screens, window-grills, ornamental hinges, and the like.

In its hot plastic state iron can be formed and modeled under the hammer to almost any degree of refinement, while its great strength allows it to be beaten out into leaves and ornaments of almost paper-like thinness and delicacy. With repeated hammering, drawing out, and annealing, it gains much in strength and toughness, and the addition of a very minute quantity of carbon converts it into steel, less tough, but of the keenest hardness. The large employment of cast iron is comparatively modern, in England at least only dating from the sixteenth century; it is not, however, incapable of artistic treatment if due regard be paid to the necessities of casting, and if no attempt is made to imitate the fine-drawn lightness to which wrought iron so readily lends itself. At the best, however, it is not generally suited for the finest work, as the great contraction of iron in passing from the fluid to the solid state renders the cast somewhat blunt and spiritless.

Among the Assyrians, Egyptians, and Greeks the use of iron, either cast or wrought, was very limited, bronze being the favorite metal for almost all purposes. The difficulty of smelting the ore was probably one reason for this, as well as the now forgotten skill which enabled bronze to be tempered to a steel-like edge. Gold, silver, and bronze may be treated in various ways, the chief of which are casting in a mold, and treatment by hammering and punching.

METAMORPHOSIS. This term is often employed in several distinct senses in biology. During the early part of the century it was constantly used to include the current morphological conceptions, as, for instance, of the parts of a flower as modified or "metamorphosed" leaves, or of the segments of a skull as modified vertebræ. It is still frequently employed to denote that progressive change from the general to the special undergone by all developing tissues and organs (see **BIOLOGY**, **EMBRYOLOGY**), but in this sense is conveniently superseded by the term "differentiation." In the process of animal development, two types are broadly distinguishable—a fetal type, in which development takes place wholly or in greater part either within the egg or within

the body of the parent, and a larval type, in which the young are born in a condition more or less differing from that of the adult, while the adult stage again is reached in one of two ways, either by a process of gradual change, or by a succession of more or less rapid and striking transformations, to which the term metamorphosis is now usually restricted.

METAPHYSIC. The term metaphysic, originally intended to mark the place of a particular treatise in the collection of Aristotle's works, has, mainly owing to a misunderstanding, survived several other titles—such as "First Philosophy," "Ontology," and "Theology," which Aristotle himself used or suggested. Neo-Platonic mystics interpreted it as signifying that which is not merely "after" but "beyond" physics, and found in it a fit designation for a science which, as they held, could not be attained except by one who had turned his back upon the natural world. And writers of a different tendency in a later time gladly accepted it as a convenient nickname for theories which they regarded as having no basis in experience, in the same spirit in which the great German minister Stein used the analogous title of "metapolitics" for airy and unpractical schemes of social reform. A brief indication of the contents of Aristotle's treatise may enable us to give a general definition of the science which was first distinctly constituted by it, and to determine in what sense the subjects which that science has to consider are beyond nature and experience.

For Aristotle, metaphysic is the science which has to do with Being as such, Being in general, as distinguished from the special sciences which deal with special forms of being. There are certain questions which, in Aristotle's view, we have a right to ask in regard to everything that presents itself as real. We may ask what is its ideal nature or definition, and what are the conditions of its realization; we may ask by what or whom it was produced, and for what end; we may ask, in other words, for the formal and the material, for the efficient and the final causes of everything that is. These different questions point to different elements in our notion of Being, elements which may be considered in their general relations apart from any particular case of their union. These, therefore, the first philosophy must investigate. But, further, this science of being cannot be entirely separated from the science of knowing, but must determine at least its most general principles. For the science that deals with what is most universal in being is, for that very reason, dealing with the objects which are most nearly akin to the intelligence. These, indeed, are not the objects which are first presented to our minds; we begin with the particular, not the universal; but science reaches its true form only when the order of thought is made one with the order of nature, and the particular is known through the universal. Yet this conversion or revolution of the intellectual point of view is not to be regarded as an absolute change from error to truth; for Aristotle holds that in sense perception there is already the working of that discriminative intelligence which, beginning in sense perception, with the distinction of particular from particular, can rest only when it has apprehended things in their universal forms or definitions. Looking at knowledge *formally*, the highest law of thought, the law of contradiction (or, as we might call it, to indicate Aristotle's meaning more exactly, the law of definition or distinction), is already implied in the first act of perception by which one thing is distinguished from another. Looking at it *materially*, the reason of man is to be conceived as potentially all that is knowable; *i.e.*, objects are so related to it that for it to know them in their essential definitions is only to know itself. The

aim of science, in this view, is to break through the husk of matter, and to apprehend things in their forms, in which they are one with the mind that knows them. Hence also it follows that in rising to the most universal science, the science of Being in general, the mind is not leaving the region of immediate experience, in which it is at home, for a far-off region of abstractions. Rather it is returning to itself, apprehending that which is most closely related to itself, and which, therefore, though it is late in being made the direct object of investigation, is yet presupposed in all that is, and is known.

Metaphysic, then, is the science which deals with the principles which are presupposed in all being and knowing, though they are brought to light only by philosophy. Another trait completes the Aristotelian account of it. It is theology, or the science of God. Now God is pure self-consciousness, the absolute thought which is one with its objects, and He is, therefore, the first cause of all existence. For, while the world of nature is a world of motion and change, in which form is realized in matter, this process of the finite can be explained only by referring it back to an unmoved mover, in whom there is no distinction of matter and form, and who is, therefore, in Aristotle's view, to be conceived as pure form, the purely ideal or theoretic activity of a consciousness whose object is itself. Such a conception, however, while it secures the independence and absoluteness of the unmoved mover, by removing him from all relation to what is other than himself, seems to make his connection with the world inexplicable. We can on this theory refer the world to God, but not God to the world. Hence Aristotle seems sometimes to say that God is the first mover only as He is the last end after which all creation strives, and this leads him to attribute to nature a desire or will which is directed toward the good as its object or end.

Aristotle then brings together in his metaphysic three elements which are often separated from each other, and the connection of which is far from being at once obvious. It is to him the science of the first principles of being. It is also the science of the first principles of knowing. Lastly, it is the science of God, as the beginning and end of all things, the absolute unity of being and thought, in which all differences of finite thought and existence are either excluded or overcome.

To some this description of the contents of Aristotle's treatise, and especially the last part of it, may seem to be a confirmation of all the worst charges brought against metaphysic. For at both extremes this supposed science seems to deal with that which is beyond experience, and which, therefore, cannot be verified by it. It takes us back to a beginning which is prior to the existence as well as to the consciousness of finite objects in time and space, and on to an end to which no scientific prophecy based upon our consciousness of such objects can reach. In the former aspect of it, it has to do with notions so abstract and general that it seems as if they could not be fixed or tested by reference to any experience, but must necessarily be the playthings of dialectical sophistry. In the latter aspect of it, it entangles us in questions as to the final cause and ultimate meaning of things, questions involving so comprehensive a view of the infinite universe in which we are insignificant parts that it seems as if any attempt to answer them must be for us vain and presumptuous. On both sides, therefore, metaphysic appears to be an attempt to occupy regions which are beyond the habitable space of the intelligible world—to deal with ideas which are either so vague and abstract that they cannot be fastened to any definite meaning, or so complex and far-reaching that they can never by any possibility be

verified. For beings like men, fixed within these narrow limits of space and time, the true course, it would seem, is to "cultivate their gardens," asking neither whence they come nor whither they go, or asking it only within the possible limits of history and scientific prophecy. To go back to the beginning or on to the end is beyond them, even in a temporal, still more in a metaphysical, sense. Our state is best pictured by that early Anglican philosopher who compared it to a bird flying through a lighted room "between the night and the night." The true aim of philosophy is, therefore, it would seem, to direct our thoughts to the careful examination and utilization of the narrow space allotted to us by an inscrutable power, and with scientific self-restraint to refrain from all speculation either on first or on final causes.

METAPONTUM, or METAPONTIUM, a city of Magna Græcia, situated on the Gulf of Tarentum, near the mouth of the river Bradanus. It was founded by an Achæan colony about 700 B.C., though various traditions existed which assigned it an earlier origin.

METASTASIO. Pietro Trapassi, the Italian poet, who is better known by his assumed name of Metastasio, was born in Rome, January 6, 1698. Pietro, while quite a child, showed an extraordinary talent for improvisation, and often held a crowd attentive in the streets while he recited impromptu verses on a given subject. Metastasio soon found himself competing with the most celebrated improvisatori of his time in Italy. At the age of twelve, while attending to classical and legal studies, he translated the *Iliad* into octave stanzas; and two years later he composed a tragedy in the manner of Seneca upon a subject chosen from Trissino's *Italia Liberata*. In 1721 he composed an epithalamium, and probably also his first musical serenade, *Endimione*, on the occasion of the marriage of his patroness the Princess Pinelli di Sangro to the Marchese Belmonte Pignatelli. In 1722 the birthday of the empress had to be celebrated with more than ordinary honors, and the viceroy applied to Metastasio to compose a serenata for the occasion. It was arranged that his authorship should be kept a profound secret. Under these conditions Metastasio produced *Gli Orti Esperidi*. Set to music by Porpora, it won the most extraordinary applause.

Metastasio resided with La Romanina and her husband in Rome. Under her influence he wrote in rapid succession the *Didone Abbandonata*, *Catone in Utica*, *Ezio*, *Alessandro nell' Indie*, *Semiramide Riconosciuta*, *Siroe*, and *Artaserse*. These dramas were set to music by the chief composers of the day, and performed in the chief towns of Italy.

In the early summer of 1730, Metastasio settled at Vienna in the house of a Spanish Neapolitan, Niccolò Martinez, where he resided until his death. This date marks a new period in his artistic activity. Between the years 1730 and 1740 his finest dramas, *Adriano*, *Demetrio*, *Issipile*, *Demofonte*, *Olimpiade*, *Clemenza di Tito*, *Achille in Sciro*, *Temistocle*, and *Attilio Regolo*, were produced for the imperial theater. Some of them had to be composed for special occasions, with almost incredible rapidity—the *Achille* in eighteen days, the *Ipermestra* in nine. As time advanced the life which Metastasio led at Vienna, together with the climate, told upon his health and spirits. He sank rapidly into the habits of old age; and, though his life was prolonged till the year 1782, very little can be said about it. On the 12th of April he died.

METCALFE, CHARLES THEOPHILUS METCALFE, BARON, a distinguished administrator, was born at Calcutta, January 30, 1785. He died September 5, 1846.

METELLUS, the name of the most important

family of the Roman plebeian gens Cæcilia. They rose to distinction during the Second Punic War, and Nævius satirized them.

QUINTUS CÆCILIVS METELLVS MACEDONICVS, prætor, 148 B.C., in Macedonia, defeated Andriscus in two battles, and forced him to surrender. He then superintended the conversion of Macedonia into a Roman province. He was a moderate reformer, and was considered the model of a fortunate man; before his death in 115, three of his sons had been consuls, one censor, and the fourth was a candidate for the consulship.

QUINTUS CÆCILIVS METELLVS NUMIDICVS, whose reputation for integrity was such that when he was accused of extortion the jury refused to examine his accounts, was selected to command against Jugurtha in 109 B.C. He subjected the army to rigid discipline, and aimed solely at seizing Jugurtha himself; he defeated the king by the river Muthul, and next year, after a difficult march through the desert, took his stronghold, Thala.

QUINTUS CÆCILIVS METELLVS PIVS, so called from his efforts to restore his father Numidicus, commanded in the Social War, defeating Q. Pompædus, (88 B.C.) Sulla on departing gave him proconsular command over South Italy.

QUINTUS CÆCILIVS METELLVS PIVS SCIPIO, son of Scipio Nasica, was adopted by the preceding. He was accused of bribery in 60 B.C., and defended by Cicero. In August, 52, Pompeius procured him the consulship. In 46 he was defeated at Thapsus; in his flight to Spain he was stopped by a corsair, and stabbed himself.

QUINTUS CÆCILIVS METELLVS CELER, prætor 63 B.C., was sent to cut off Catiline's retreat northward. Consul in 61, his personal influence prevented the holding of the Compitalia, which the senate had forbidden and the tribunes permitted. He opposed the agrarian law of the tribune L. Flavius; and stood firm even though imprisoned; the law had to be given up. He also tried, though fruitlessly, to obstruct Cæsar's agrarian law in 59. He died that year under suspicion of poison given by his wife, Clodia.

METEMPSYCHOSIS, the transmigration of the soul, as an immortal essence, into successive bodily forms, either human or animal. This doctrine, famous in antiquity, and one of the characteristic doctrines of Pythagoras, appears to have originated in Egypt. This indeed is affirmed by Herodotus. Plato, in a well-known passage of the *Phædrus*, adapts, as was his wont, the Pythagorean doctrine to his myth or allegory about the soul of the philosopher. That soul, he says, though it may have suffered a fall in its attempt to contemplate celestial things, still is not condemned, in its first entrance into another form, to any bestial existence, but, according to its attainments, *i. e.*, to the progress which it has made in its aspiration for celestial verities, it passes, in nine distinct grades, into the body of someone destined to become a philosopher, a poet, a king, a general, a seer, etc., or, if very inferior, it will animate a sophist or an autocrat. Plato extends the cycle of existence to 10,000 years, which is subdivided into periods of 1,000 years, after the lapse of which the souls undergo judgment, and are admitted to everlasting happiness or condemned to punishment. It is after the period of 1,000 years, he adds, that the human soul comes into a beast, and from a beast again into a man, if the soul originally was human.

Pythagoras, who was said to have traveled in Egypt, brought this fantastic doctrine into Magna Græcia, and made it a prominent part of his teaching. He declared that he had himself been Euphorbus, the son of Panthus, in the time of the Trojan War, and had successively inhabited other human bodies, the actions of all

which he remembered. Closely connected with his theory of metempsychosis was his strict precept to abstain from animal food, even from eggs, from some kinds of fish, and (for some unknown, probably symbolical, reason) from beans. There can be no doubt that the Egyptian custom of preserving the mummies of cats, crocodiles, and some other creatures had its origin in the notion that they had been inhabited by souls which might someday claim these bodies for their own. We cannot suppose that Plato or the later Greeks really believed in the transmigration of souls, though there are many allusions to it, generally of a somewhat playful character.

METEOR, METEORITE. The term meteor, in accordance with its etymology, meant originally something high in the air. It has been applied to a large variety of phenomena, most of them of brief duration, which have place in the atmosphere. Disturbances in the air are aerial meteors, viz., winds, tornadoes, whirlwinds, typhoons, hurricanes, etc. The vapor of water in the atmosphere creates by its forms and precipitations the aqueous meteors, viz., clouds, fogs, mists, snow, rain, hail, etc. The effect of light upon the atmosphere and its contents causes certain luminous meteors, viz., rainbows, halos, parhelia, twilight, mirage, etc. Discussion of all these, and of like phenomena, belongs to METEOROLOGY, (*q. v.*)

Another class of luminous meteors, known as shooting or falling stars, fireballs, bolides, etc., have their place in the upper parts of the atmosphere. But by reason of their origin from without, they, and the aërolites or meteorites which sometimes come from them, belong properly to astronomy. The term meteor is often used in a restricted sense as meaning one of these latter phenomena. The present article will treat of them alone.

The most remarkable of the meteors (and the most instructive) are those which are followed by the falling of stones to the earth. These have since the beginning of the present century attracted so much attention, and the phenomena have been so frequently examined and described by scientific men, that they are very well understood. The circumstances accompanying the fall of stones are tolerably uniform. A ball of fire crosses the sky so bright as to be visible, if it appears in the daytime, sometimes even at hundreds of miles from the meteor; and if it appears in the night it is bright enough to light up the whole landscape. It traverses the sky, generally finishing its course in a few seconds. It suddenly goes out, either with or without an apparent bursting in pieces, and after a short period a loud detonation is heard in all the region near the place where the meteor has disappeared. Sometimes only a single stone, sometimes several are found. For some falls they are numbered by thousands. About 3,000 were obtained from the fall of L'Aigle in 1803, scattered over a region about seven miles long and of less breadth. From the Emmet county (Iowa) fall, May 10, 1879, a similarly large number have been secured.

These meteors leave behind them in the air a cloud or train that may disappear in a few seconds, or may remain an hour. They come at all times of day, at all seasons of the year, and in all regions of the earth. They come irrespective of the phases of the weather, except as clouds conceal them from view.

On the evening of December 2, 1876, persons in the State of Kansas saw, about eight o'clock in the evening, a bright fireball rising from near where the moon then was in the western sky. It increased in brilliancy as it proceeded, becoming so bright as to compel the attention of everyone who was out of doors. To persons in the northern part of the State the meteor crossed the

southern sky going to the east, to those in the southern part it crossed the northern heavens. To all it went down near to the horizon a little to the north of east, the whole flight as they saw it occupying not over a minute.

The same meteor was seen to pass in nearly the same way across the heavens from west-southwest to east-northeast by inhabitants of the States of Nebraska, Iowa, Missouri, Wisconsin, Illinois, Michigan, Kentucky, Indiana, Ohio, Pennsylvania, and West Virginia. But besides this there were heard near the meteor's path, four or five minutes after its passage, loud explosions like distant cannonading, or thunder, or like the rattling of empty wagons over stony roads. So loud were these that people and animals were frightened. East of the Mississippi river these explosions were heard everywhere within about sixty miles of the meteor's path; and in Bloomington, Ind., sounds were heard supposed to come from the meteor even at a distance of nearly 150 miles from it. Over central Illinois it was seen to break into fragments like a rocket, and over Indiana and Ohio it formed a flock or cluster of meteors computed to be forty miles long and five miles broad. The sky in New York State was wholly overcast. Persons in Ohio and Pennsylvania, who from their situation could look over the cloud last, saw the meteor passing on eastward toward New York. From many places in that State itself came accounts of rattling of houses, thundering noises, and other like phenomena, which at the time were attributed to an earthquake.

At one place in northern Indiana a farmer heard a heavy thud as of an object striking the ground near his house. The next morning he found on the snow a stone of very peculiar appearance weighing three-quarters of a pound, which from its character there is every reason to believe came from the meteor. By putting together the various accounts of observers, the meteor is shown to have become first visible when it was near the northwest corner of the Indian Territory, at an elevation of between 60 and 100 miles above the earth. From here it went nearly parallel to the earth's surface, and nearly in a right line, to a point over central New York. During the latter part of its course its height was thirty or forty miles. It thus traversed the upper regions of the air through 25° of longitude and 5° of latitude in a period of time not easily determined, but probably about two minutes. A part of the body may have passed on out of the atmosphere, but probably the remnants came somewhere to the ground in New York, or farther east.

Next to the stone-producing meteor is the fireball, or bolide, which gives generally a less brilliant light than the former, but in essential appearances is like it. The bolides leave trains of light behind them just as the stone meteors do; they travel with similar velocities both apparent and actual, and in all respects exhibit only such differences of phenomena as would be fully explained by differences in size, cohesion, and chemical constitution of the stones causing them.

Next to the bolide is a smaller meteor which appears as if one of the stars were to leave its place in the heavens, shoot across the sky, and disappear—all within the fraction of a second. Some meteors of this class are as bright as Venus or Jupiter. Some are so small that though you look directly at the meteor, you doubt whether you see one or not. In the telescope still smaller ones are seen that are invisible to the naked eye. Meteors comparable in brightness to the planets and the fixed stars are usually called shooting stars. The first important fact about the meteors is the region in which they become visible to us. In hundreds of in-

stances observations have been made upon the luminous path of a meteor at two or more stations many miles apart. When such stations and the path are properly situated relatively to each other, observations carefully made will show a parallax by which the height of the meteor above the earth, the length and direction of the path, and other like quantities may be computed. The general result from several hundred instances is that the region of meteor paths may be in general regarded as between forty and eighty miles above the earth's surface. Some first appear above eighty miles, and some descend below forty miles. But an altitude greater than 100 miles, or one below twenty-five, except in the case of a stone-furnishing meteor, must be regarded as very doubtful. Thus the meteor paths are far above the usual meteorological phenomena, which (except auroras and twilight) have not one-tenth of the height of the meteors. But with reference to all other astronomical phenomena they are very close to us. The comets, for example, are well-nigh a million-fold, and even the moon is a thousandfold, more distant from us.

In regard to velocities of meteors we may only say in general that the velocities computed from good observations are rarely, if ever, under eight or ten miles a second, or over forty or fifty miles, and that some have far greater velocities than others. The average velocity seems to be nearly thirty miles.

The cause of a meteor is now universally admitted to be something that enters the earth's atmosphere from without, with a velocity relative to the earth that is comparable with the earth's velocity in its orbit, which is nineteen miles per second. By the resistance it meets in penetrating the air the light and other phenomena of the luminous train are produced. Under favorable circumstances, portions of these bodies reach the earth's surface as meteorites.

A body which is traveling in space, and which on coming into the air would under favorable circumstances become a meteor, may be called a meteoroid. The meteoroids are all solid bodies. It would hardly be possible for a small quantity of gas out in space to retain such a density as would enable it on coming into the air to go 10 or 100 miles through even the rare upper atmosphere, and give us the clear line which a shooting star describes. Even if a liquid or gaseous mass can travel as such in space, it would be instantly scattered on striking the air, and would appear very unlike a shooting star or bolide.

Of the larger meteors there are in the mean six or eight per annum which in the last fifty years have furnished stones for our collections. A much larger number have doubtless sent down stones which have never been found. Thus Daubrée estimates for the whole earth an annual number of 600 or 700 stone-falls.

But of the small meteors or shooting stars the number is very much larger. There come into the air not less than 20,000,000 of bodies daily, each of which, under very favorable conditions of absence of sunlight, moonlight, clouds, and mists, would furnish a shooting star visible to the naked eye.

The meteoroids, whatever be their size, must by the law of gravitation have motions about the sun in the same way as the planets and comets, that is, in conic sections of which the sun is always at one focus. The apparent motions of the meteors across the sky imply that these motions of the meteoroids relative to the sun cannot as a rule be in or near the plane of the ecliptic. For if they were there, since the motion of the earth is also in the ecliptic, the motion of the meteoroids relative to the earth would be in the same plane. This would involve that all the meteor paths as seen on the

sky would, if produced backward, cross the ecliptic above the horizon. In fact there is no tendency of this kind. Hence the meteoroids do not move in orbits that are near the ecliptic as the planets do, but like the comets they may and usually do have orbits of considerable inclinations.

While the average number of shooting stars for a single observer at midnight may be regarded as tolerably constant, there have been special epochs when many more have been seen. In certain instances the sky has been filled with the luminous trains, just as it is filled by descending snowflakes in a snowstorm, making a veritable shower of fire. One of the best-observed, though by no means the most brilliant, of these showers occurred on the evening of November 27, 1872. Some of the observers of that shower, counting singly, saw at the rate of 8,000 or 10,000 shooting stars in the course of two hours. The distances of the meteoroids in the middle of the swarm which the earth then passed through, each from its nearer neighbors, would be thirty or forty miles.

On several years after 1833, and before and after 1866-68, there were unusual numbers of those meteors seen on the mornings of November 13th, 14th, and 15th, though perhaps they would have been unnoticed had there not been special watching for them. It will be seen that all these showers are at intervals of a third of a century, that they are at a fixed day of the year, and that the day has moved steadily and uniformly along the calendar at the rate of about a month in a thousand years. The change of twelve days in the seventeenth century is due to the change from old to new style. The only explanation of this periodical display that is now seriously urged, and the one which is universally accepted by astronomers, is that there is a long, thin stream of meteoroids, each of which is traveling about the sun in a conic section. These conic sections are all nearly parallel, and have nearly the same major axis, extending out about as far as the orbit of Uranus, and each requiring the common period of thirty-three and a quarter years. The length of the stream is such that the most advanced members are six or eight years ahead of the hindermost, and they all cross the earth's orbit with a velocity of about twenty-six miles a second. Since the earth plunges through the group in nearly an opposite direction, the velocity with which they enter the air is forty-four miles a second. One of the facts which have greatly aided us in arriving at this explanation is that these meteors in all the years and through all hours of the night cross the sky as we look at them in lines which diverge from a point near the center of the sickle in the constellation Leo; hence the paths in the air are parallel. This implies that their velocities relative to the sun are all parallel and equal to each other. The radiation from Leo has given them the name *Léonids*.

METEORA, a remarkable group of rock-built monasteries in Thessaly, in the northern side of the valley of the Peneus, not quite twenty miles northeast of Triccala, and in the immediate vicinity of the village of Kalabaka, Stagis, or Stagoi (the ancient Æginium). On the summit of these rocky pinnacles—accessible only by the aid of rope and basket let down from the top, or in some cases by a series of almost perpendicular ladders climbing the cliff to the mouth of a tunnel—stand the monasteries of Meteora. At one time they were twenty-four in number. Meteora *par excellence* is the largest and perhaps the most ancient. The present building was erected, according to Leake's reading of the local inscription, in 1388 (Björnstahl, the Swedish traveler, had given 1371), and the church is one of the largest and handsomest in Greece.

METEOROLOGY, in its original and etymological

sense, included within its scope all appearances of the sky, astronomical as well as atmospherical, but the term is now restricted to the description and explanation of the phenomena of the atmosphere which may be conveniently grouped under weather and climate. These phenomena relate to the action of the forces on which the variations of pressure, temperature, humidity, and electricity of the atmosphere depend, but in an especial sense to the aerial movements which necessarily result from these variations.

In the more exact development of meteorology, the scientific investigation of climate long preceded that of weather. Humboldt's work on *Isothermal Lines*, published in 1817, must be regarded as the first great contribution to meteorological science. Dove continued and extended the investigation, and in his great work *On the Distribution of Heat on the Surface of the Globe*, published in 1852, gave charts showing the mean temperature of the world for each month and for the year, together with charts of abnormal temperature. To this, more than to any other work, belongs the merit of having popularized the science of meteorology in the best sense, by enlisting in its service troops of observers in all parts of the civilized world.

In 1868 another series of important charts were published representing by isobaric lines the distribution of the mass of the earth's atmosphere, and by arrows the prevailing winds over the globe for the months and the year. By these charts the movements of the atmosphere and the immediate causes of these movements were for the first time approximately stated, and some knowledge was thereby attained of some of the more difficult problems of meteorology. It was shown that the prevailing winds are the simple result of the relative distribution of the mass of the earth's atmosphere, in other words, of the relative distribution of its pressure, the direction and force of the prevailing winds being simply the flow of the air from a region of higher toward a region of lower pressure, or from where there is a surplus to where there is a deficiency of air. It is on this broad and vital principle that meteorology rests, which is found to be of universal application throughout the science, in explanation, not only of prevailing winds, but of all winds, and of weather and weather changes generally. One of the more important uses of the principle is in its furnishing the key to the climates of the different regions of the earth; for climate is practically determined by the temperature and moisture of the air, and these in their turn are dependent on the prevailing winds, which are charged with the temperature and moisture of the regions they have traversed. The isobaric charts show further that the distribution of the mass of the earth's atmosphere depends on the geographical distribution of land and water in their relation to the sun's heat and the radiation toward the regions of space in different seasons.

In 1882 Loomis published a map showing the mean rainfall of the globe. This map and others that have been constructed for separate countries show conclusively that the rainfall of any region is determined by the prevailing winds considered in relation to regions from which they have come, and the physical configuration and temperature of the part of the earth's surface over which they blow. The maximum rainfall is precipitated by winds which, having traversed a large breadth of ocean, come up against and blow over a mountainous ridge lying across their path, and the amount deposited is still further increased if the winds pass at the same time through regions the temperature of which constantly becomes colder. On the other hand, the rainfall is usually small, or *nil* when the prevailing winds have not previously traversed some extent of

ocean, but have crossed a mountain ridge and advanced at the same time into lower latitudes, or regions the temperature of which is markedly higher.

While the observational data for the determination of the geographical distribution of the prime elements of climate, viz., the pressure, temperature, moisture, and movements of the atmosphere and the rainfall were being slowly but surely collected, the great importance of the study of weather came gradually to be recognized. Additional impetus was given to this branch of study from its intimate bearings on the eminently practical question of storm warnings. Synchronous weather maps, showing the weather over a considerable portion of the earth's surface, were constructed, and some advance was made in tracing the progress of storms from day to day. Unquestionably one of the first problems of meteorology is to ascertain the course storms usually follow and the causes by which that course is determined, so as to deduce from the meteorological phenomena observed, not only the certain approach of a storm, but also the particular course that storm will take. The method of practically conducting this large inquiry in the most effective manner was devised by Leverrier, and begun to be carried out in 1858 by the publication of the *Bulletin International*, to which a weather map was added in September, 1863. This map showed graphically for the morning of the day of publication the atmospheric pressure, and the direction and force of the wind, together with tables of temperature, rainfall, cloud, and sea disturbance from a large number of places in all parts of Europe. From such weather maps forecasts of storms are framed and suitable warnings issued; but above all a body of information in a very handy form is being collected, the careful study and discussion of which is slowly but gradually leading to the issue of more exact and satisfactory forecasts of weather, and to a juster knowledge of these great atmospheric movements which form the groundwork of the science.

An interchange of heat is constantly going on among bodies exposed to each other, whatever be their temperature. This mode by which heat is communicated from one body to another is called radiation. Radiant heat proceeds in straight lines, diverging in all directions from the source, is only in a limited degree influenced by the air through which it passes, and is not diverted from the straight course by the wind. The intensity is proportional to the temperature of the source, and is greater according to the degree of inclination of the surface on which the rays fall.

If, then, a body be placed in the presence of other bodies, some colder and some warmer than itself, it will from this mutual interchange of temperature receive more heat from the warmer bodies than it radiates to them, and consequently becomes warmer; but it will receive less heat from the colder bodies than it radiates to them and its temperature consequently falls. This is precisely the condition in which the earth is placed in space. When a part of the surface is turned toward the sun, that part of the surface receives more heat than is radiated from it; and the temperature consequently rises most in that region which for the time is perpendicular to the sun's rays, and least around the annulus where the inclination of the surface is greatest. On the other hand, since the hemisphere turned from the sun radiates more heat than it receives from the cold region of space, the temperature there falls. Owing to the essentially distinct conditions under which the earth is placed with respect to radiation, the subject falls naturally to be divided into two heads, solar radiation and terrestrial radiation.

Of the sun's rays which arrive at the earth's surface,

those which fall on the land and solid bodies generally are wholly absorbed by the thin surface layer exposed to the heating rays, the temperature of which consequently rises. While the temperature of the surface increases, a wave of heat is propagated downward through the soil. The intensity of the daily wave of temperature rapidly lessens with the depth at a rate depending on the conductivity of the soil, until at about four feet below the surface it ceases to be measurable. Part of the heat of the surface layer is conveyed upward through the air by the convection currents which have their origin in the heating of the lowermost stratum of air in direct contact with the heated surface of the land.

Altogether different is the influence of the sun's rays on water. In this case the sun's heat is not all, indeed very far from all, arrested at the surface, but penetrates to a considerable depth. The depth to which the influence of the sun is felt has been shown by the observations made during the cruise of the *Challenger* to be, roughly speaking, about 500 feet below the surface of the sea. The rate at which, in perfectly clear water, this heat is distributed at different depths is a problem that has not yet been worked out.

In shallow water the sun's heat raises the temperature much higher than that of deep water, this being obvious from the consideration that nearly the whole of the sun's heat which falls on the surface is utilized in raising the temperature of the shallow layer of water; in other words, it is, so to speak, concentrated through a small depth of water instead of being diffused through a great depth.

The times of occurrence of the highest, lowest, and mean daily temperatures, and the amount of the daily range of temperature, are in a great degree influenced by the covering or want of covering of the earth's surface on which the air rests. When the ground is covered with vegetation, the whole of the solar heat falls on the vegetable covering; and, as none falls immediately on the soil, its temperature does not rise so high as happens where there is no vegetable covering to shade the surface from the sun. The temperature of plants exposed to the sun is not so high as that of exposed soil in the vicinity. As regards forests, the four diurnal phases of temperature occur later than in the open country, and the maximum and minimum are less decided; and, since the maximum temperature of the air in forests falls short of the maximum in the open to a considerably greater extent than the minimum under trees is above the minimum in the open, it follows that the mean temperature of the air in forests is less than that of the open country adjoining. The reason of the difference is that the chilling effects of nocturnal radiation penetrate lower down among the trees than do the heating effects of solar radiation; and as the soil is not heated directly by the sun its temperature is lower, and consequently that of the air over it is also lower. A cleared space in a forest, sheltered by the surrounding trees, but open to the sun, has a warmer and moister atmosphere in spring and summer and very much moister in autumn than prevails in the open country adjoining, and has also the diurnal differences of range peculiar to a warmer and moister atmosphere.

One of the most important elements of climate is disclosed by the difference between the hour of lowest and the hour of highest mean temperature respectively, or, as it is usually expressed, by the daily range of temperature. In the same part of the Atlantic the daily range of the temperature of the air resting on the ocean is 3.2° , and on the sea near land 4.4° . On advancing on the land, the daily range of temperature rapidly increases, and the rate of increase is greatly augmented when an inland position is arrived at to which any sea breezes that may prevail do not extend.

The true daily range of temperature is stated by observations made with maximum and minimum thermometers. Generally speaking, the amount of the range increases as the latitude is diminished, and as the distance from the sea is increased, but above all it increases in proportion to the dryness of the climate.

The gaseous envelope surrounding the earth is composed of two atmospheres, quite distinct from each other—an atmosphere of dry air and an atmosphere of aqueous vapor. The dry air, which consists of oxygen and nitrogen, is always a gas, and its quantity remains constant; but the aqueous vapor does not continue permanently in the gaseous state, and the quantity present in the air is, by the ceaseless processes of evaporation and condensation, constantly changing. If the aqueous vapor remained permanently and unchanged in the atmosphere, or were not liable to be condensed into cloud or rain, the mixture would become as complete as that of the oxygen and nitrogen of the air. The equilibrium of the vapor atmosphere, however, is being constantly disturbed by every change of temperature, by every instance of condensation, and by the unceasing process of evaporation. Since dry air further materially obstructs the free diffusion of the aqueous vapor, it follows that the law of the independent pressure of the vapor and of the dry air of the atmosphere holds good only approximately. The aqueous vapor, however, constantly tends to approach this state. Since, then, the independent and equal diffusion of the dry air and the aqueous vapor is, owing to these disturbing causes, never reached, the important conclusion follows that the hygrometer can never indicate more than the local humidity of the place where it is observed. Hygrometric observations can therefore be regarded only as approximations to a true indication of the quantity of aqueous vapor in the atmosphere over the place of observation. It is, however, to be added that, while in certain cases the amount of vapor indicated is far from the truth, yet in averages, particularly long averages, a close approximation to the real amount is reached if the hygrometer be at all tolerably well exposed and carefully observed.

Aqueous vapor is constantly being added to the air from the surfaces of water, snow, and ice, from moist surfaces, and from plants. The rate of evaporation increases with an increase of temperature, because the capacity of the air for vapor is thereby increased. The atmosphere can contain only a certain definite amount of vapor, according to the temperature; when, therefore, the air has its full complement of vapor, or when, in other words, it is saturated, evaporation ceases. Thus the rate of evaporation is greatest when the air is driest or freest from vapor, and least when the air is nearest the point of saturation. Since currents of air remove the moisture and substitute drier air over the evaporating surfaces, evaporation is much more rapid during wind than in calm weather. As air expands under a diminished pressure, its temperature consequently falls, and it continues to approach nearer to the point of saturation, or becomes moister; and, as it contracts under an increased pressure, its temperature rises and it recedes from the point of saturation or becomes drier. Hence ascending currents of air become moister with every addition to the ascent, and descending currents drier as they continue to descend. Thus as winds ascend the slopes of hills they become moister, but when they have crossed the summit and flow down the other side they become drier in proportion to the descent, and all the changes may be experienced from extreme dryness to saturation in the same mass of air, which all the time has practically had its amount of aqueous vapor neither added to nor diminished.

In an atmosphere of air and aqueous vapor perfectly mixed, the elastic force of each at the surface of the earth is the pressure of each. In this case the elastic force of aqueous vapor would be the pressure of the whole vapor in the atmosphere over the place of observation. This pressure is expressed in inches of mercury of the barometer. If we suppose the total barometric pressure to be 30 inches, and the elastic force of vapor to be 0.745 inch, the pressure or weight of the dry air, or air proper, would be 29.255 inches, and of the aqueous vapor 0.745 inch. From this it follows that the elastic force of vapor may be regarded as indicating the quantity of aqueous vapor in the air at the place of observation, or it may be designated the absolute humidity of the air.

The diurnal variation in the elastic force of vapor in the air is seen in its simplest form on the open sea. The disturbance induced by proximity to land in the distribution of the aqueous vapor in the lower strata of the atmosphere is very striking. The maximum and minimum no longer follow the corresponding phases of the temperature of the surface of the sea and of the air. The disturbing agents are the sea and land breezes and their effects. Under the influence of the land breeze the time of the minimum humidity is delayed till about 6 A.M.; and under the influence of the sea breeze and its effects the amount of the aqueous vapor shows a secondary minimum from noon to 2 P.M. It is to be here noted that this midday minimum occurs at the hours of the day when the surface of the land is most highly heated, the ascending current of heated air rising from it therefore strongest, and the resulting breeze from the sea toward the land also strongest.

Next to the winds, the aqueous vapor of the atmosphere, in the diverse ways in which in different localities it is distributed through the hours of the day, plays the most important part in giving to the different parts of the globe its infinitely diversified climates.

Dew is deposited over the earth's surface on comparatively clear and calm nights. As the cooling by terrestrial radiation continues, the temperature of objects on the surface is gradually lowered to the dew-point, and when this point is reached the aqueous vapor begins to be condensed into dew on their surfaces. The quantity deposited is in proportion to the degree of cold produced and the quantity of vapor in the air. Dew is not deposited in cloudy weather, because clouds obstruct the escape of heat by radiation, nor in windy weather, because wind continually renews the air in contact with the surface, thus preventing the temperature from falling sufficiently low. When the temperature is below 32°, dew freezes as it is deposited, and *hoar-frost* is produced. The dew-point practically determines the minimum temperature of the night—because if the temperature falls a little below the dew-point the liberation of heat as the vapor is condensed into dew speedily raises it, and if it rises higher the loss of heat by radiation speedily lowers it. This consideration suggests an important practical use of the hygrometer, it being evident that by ascertaining the dew-point the approach of frost or low temperature likely to injure vegetation may be foreseen and provided against.

The forms of clouds are endless. Since clouds are subject to certain distinct modifications from the same causes which produce other atmospheric phenomena, the face of the sky may be regarded as indicating the operation of these causes, just as the face of man indicates his mental and physical states. Hence the importance of the study of clouds, and hence the necessity of a nomenclature of clouds as the basis of accurate and comparable observations. An adequate nomenclature

of clouds is still a desideratum. Luke Howard's classification, which continues to hold its ground as a provisional nomenclature, was proposed by him in 1803, and by it clouds are considered as divided into seven kinds. Of these, three are simple forms, the *cirrus*, the *cumulus*, and the *stratus*; and four intermediate or compound, the *cirro-cumulus*, the *cirro-stratus*, the *cumulo-stratus*, and the *cumulo-cirro-stratus*, *nimbus*, or *rain-cloud*.

The cirrus cloud consists of wavy, parallel, or divergent filaments, which may increase in any or all directions. It is the cloud of the least density, the greatest elevation, and the greatest variety of figure. It is probable that the particles composing it are minute crystals of ice or snowflakes. The cirrus is intimately connected with the great movements of the atmosphere; and it is solely from the movements of the cirrus that we have any direct knowledge of the upper currents of the atmosphere. In recent years much has been done, particularly by Professor Hildebrandsson of Upsala and Clement Ley, in investigating the relations of this cloud to storms and other changes of weather.

The cumulus is the name applied to those convex or conical heaps of clouds which increase upward from a horizontal base. They are generally of a very dense structure, are formed in the lower regions of the atmosphere, and are carried along by the aerial current next the earth. They form the tops of the ascending currents which rise from the heated ground, and have a diurnal period so well marked that they are often named the "cloud of the day." The forms of stratus comprehends those mists and fogs which in the calm evening of a warm summer day make their appearance in the bottom of valleys and over low-lying grounds, and sometimes spread upward over the surrounding country like an inundation; they have an equally well marked daily period, and are frequently called the "cloud of night." The cirro-cumulus is made up of small roundish masses, lying near each other, and quite separated by intervals of sky. It may be considered as formed from the cirrus by the fibers of the cloud breaking, as it were, and collapsing into roundish masses, thus destroying the texture but retaining the arrangement of that cloud. This singularly beautiful cloud is commonly known as a mackerel sky, and is of most frequent occurrence during dry, warm summer weather. The cirro-stratus consists of horizontal masses thinned toward the circumference, bent downward or undulating, and either separate or in groups. Since this cloud has great extent and continuity of substance, but little perpendicular depth or thickness, it is the cloud which most frequently fulfills the conditions for the phenomena of coronæ, solar and lunar halos, parhelia or mock suns, and paraslenæ or mock moons. The cumulo-stratus is formed by the cirro-stratus blending with the cumulus, or spreading underneath it as a horizontal layer of vapor. The cumulo-cirro-stratus, or nimbus, is the well-known rain-cloud, which consists of a cloud or system of clouds from which rain is falling. At a considerable height a sheet of cirro-stratus cloud is extended, under which cumulus clouds drift from windward; these, rapidly increasing, unite and appear to form one continuous gray mass from which the rain falls. The breaking up of the lower gray mass indicates that the rain will soon cease. When a rain-cloud is seen at a distance, cirri appear to shoot out from its top in all directions; and it is observed that the more copious the rainfall the greater is the display of cirri. The cirrus, cirro-cumulus, cirro-stratus, cumulo-stratus, and nimbus are connected more or less closely with the great atmospheric movements of the cyclone and anticyclone.

Atmospheric vapor and ascending currents thus play an important part in the history of these thunderstorms. Where the climate is dry and rainless, thunder is altogether unknown. On the other hand, where during a particular season an anticyclone with its vast descending current in the center remains over a region, as happens over the center of the old continent during the winter, over that region thunder is equally unknown during that season. Further, in places where the summer rainfall is small and its occurrence infrequent, thunderstorms become less frequent, and the hours of their occurrence are later in the day than they are before and after the dry season.

Given an initial difference of electric potential, it is easy to understand from the effects which follow the sudden extraordinary condensations of the aqueous vapor that take place how the most violent thunderstorms are produced. The difficulty is to account for the production of the initial difference of electric potential.

Whirlwinds, waterspouts, dust-storms, and tornadoes are essentially the same, differing from each other only in their dimensions, their intensity, or the degree in which the moisture is condensed into visible vapor, while the hailstorm and the rainstorm are simply the manner and degree of the precipitation accompanying them. In several important respects they differ widely and radically from cyclones. The largest tornadoes are of so decidedly smaller dimensions when compared with the smallest cyclones as to admit of no shading of the one into the other. Cyclones occur at all hours of the day and night, whereas whirlwinds and tornadoes show a diurnal period as distinctly marked as any in meteorology. Finally, cyclones take place under conditions which involve unequal atmospheric pressures or densities at the same heights of the atmosphere due to inequalities in the geographical distribution of temperature and humidity; but whirlwinds occur where for the time the air is unusually warm or moist, and where consequently temperature and humidity diminish with height at an abnormally rapid rate. Cyclones are thus phenomena resulting from a disturbance of the equilibrium of the atmosphere considered horizontally, but whirlwinds and tornadoes have their origin in a vertical disturbance of atmospheric equilibrium.

Among the most remarkable of the tornado-swept regions of the globe are certain portions of the United States; and to the examination of these the meteorological service has given special attention by a systematic, careful, and minute observation of the attendant phenomena and the destructive effects. The tornadoes of the last eighty-seven years, numbering about 600, have been classed under the different States where they are reported to have occurred. The atmospheric conditions which appear invariably to precede the formation of the tornado are violent contrasts of temperature and humidity immediately to the north and south of the path to be traversed by the storm. It is highly interesting to observe that the region of most frequent occurrence of tornadoes is the region where a large number of the cyclones of the United States appear to originate (and the same region Loomis has shown to be remarkable for violent contrasts of temperature occurring within limited spaces and times), and that, as appears in the regions of the Alleghanies, they decrease in frequency with height.

The wind of the tornado reaches a velocity probably never equaled in cyclones. During the Ohio tornado of February 4, 1842, large buildings were lifted entire from their foundations, carried several rods through the air, and then dashed to pieces, some of the fragments being carried distances of seven and eight miles; and

large oaks nearly seven feet in girth were snapped across like reeds. This tornado swept on its course at the rate of thirty-four miles an hour, and at one place did its fearful work in the brief space of a minute. The tornado which passed over Mount Carmel (Illinois), June 4, 1877, swept off the spire, vane, and gilded ball of the Methodist church, and carried it bodily fifteen miles to northeastward. The velocity of the ascending currents which kept this heavy object suspended in the air for fifteen or twenty miles must have been very great.

Of the tornadoes the progressive courses of which were recorded, 310 advanced toward northeast, 38 toward southeast, 16 toward east-northeast, 14 toward east, 7 toward north-northeast, 5 toward east-southeast, and 3 toward south-southeast. The course is thus always toward some easterly direction, the great majority being toward the northeast. The velocity of their onward movement varied from 12 to 60 miles an hour, the average being 30 miles an hour. The time occupied in passing a particular spot varied from ten seconds to half an hour, the mean time being nearly six minutes and a half. The width of the path of destruction marked with debris and other relics of the violence of the tornado varied from 40 to 10,000 feet, the average being 362 yards. The direction of the whirling movement of the tornado was invariably from right to left, or the opposite of the movement of the hands of a watch, resembling in this respect the vorticose movement of cyclones in the northern hemisphere. The passage of the tornado cloud is often described as accompanied with remarkable noises, which observers variously characterize as terrible, deafening, a terrific crash, the roar of a thousand trains of cars, or the uproarious din of innumerable pieces of machinery.

The usual position of the gyrating columns of cloud is vertical; but occasionally a curving form or slanting direction is assumed. It is probable that to these latter forms many stationary or slowly-moving dangerous squalls are to be referred, which spring up with unexpected suddenness in lakes and arms of the sea in mountainous regions.

The dust-storm of India, Arabia, and Africa is a well-marked type of the whirlwind. Previous to the outbreak of a dust-storm the air is unusually calm and sultry, just as happens in the case of the tornado. The simplest form of the dust-storm is that of a tall aerial column of sand moving onward, and drawing into itself, as it whirls around in its course, dust and other light bodies within the sweep of the strong air-currents which blow along the surface of the ground and converge vorticosely around the base of the column.

The high mean pressure in the summer in the Atlantic between Africa and the United States has with its system of winds the most decided influence in bringing about the abnormal distribution of the temperature of that and adjoining regions. Since on its west side the prevailing winds are necessarily southerly, the temperature of that region is abnormally raised, and, on the other hand, since on its east side the winds are northerly, the temperature of the region is abnormally depressed. The result of these two opposite winds is seen in the slanting direction of the isothermal of 80° across the Atlantic, which slanting direction is continued far into the interior of North America for the reasons already stated.

These important bearings of cyclonic and anticyclonic areas on temperature and climate may be thus summarized. The temperature is abnormally raised on the east side of cyclonic areas, and abnormally depressed on the west sides; but, on the other hand, temperature is abnormally raised on the west sides of

anticyclonic areas and depressed on the east sides. In the southern hemisphere these directions are reversed.

Another set of influences, powerfully affecting the temperature, come into play where the surface of the land rises above the sea into elevated plateaus, lofty peaks, or mountain ranges. Thus it has been observed on mountains that the wind during the day in summer exhibits an ascensional tendency due to the circumstance that the temperature of the surface of the mountain is heated in a much greater degree than the air strata at the same levels all around it. An ascensional current consequently rises from the mountain, which is maintained at a steadily stronger rate than at lower levels, because the drain from the updraught is easily supplied from the free surrounding atmosphere. It is the strong insolation at high elevations in the summer months which explains the excessively high day-temperatures encountered in the Rocky Mountains; and from the same conditions, viz., the rarity and purity of the atmosphere, by which terrestrial radiation is but little checked, comes the low temperatures of the nights of those climates in the same season. From this cause it follows that the elevated lands in the interior of continents tend to reduce mean atmospheric pressure in summer to a greater extent than would otherwise be the case. In winter, on the other hand, the temperature of elevated regions in the interior of continents is very much colder than that of the surrounding atmosphere at the same heights, because in such regions the air is exceedingly dry and rare, and consequently radiation to the cold regions of space but little checked. Hence down the slopes of these high lands there are poured in all directions descending currents of very cold air, which intensify the rigors of the winters experienced on the low lands round their base, where accordingly the lowest mean winter temperatures occur. These elevated lands thus materially add to the high atmospheric pressure of the interior of continents during the cold months of the year.

But it is ocean streams and ocean currents which produce the greatest abnormalities in the distribution of the temperature of the air, and it is in the North Atlantic that this cause is most strikingly seen. The increase thus accruing to the winter temperature is greatest about the north of Norway. It is also very great in the British Islands; thus, if no more heat were received than is due to their position on the globe in respect of latitude, the mean winter temperature of Shetland would be 3° and that of London 17° . But mainly owing to the heat given out by the Gulf Stream and other warm currents of the Atlantic their mean winter temperatures are respectively about 39.5° and 39° , Shetland being thus benefited 36.5° and London 22° . The chart of the winter temperature of the British Islands well illustrates the influence of the surrounding ocean in maintaining a higher temperature. It will be seen that the southwest of Ireland is 7° warmer than the east coast of England in the same latitudes. The strong drift current from near Behring's Strait southward along the coast of America has a powerful influence, particularly in lowering the summer temperature of that coast—thus bringing about, in conjunction with the dry, rainless climate of the interior, what are perhaps the most violently contrasted climates, within narrow limits, as regards their temperature. The deflections of the isothermals near the Baltic, Mediterranean, Black, and Caspian Seas, and the fresh-water lakes of America, all point to the disturbing influence of these sheets of water on the temperature.

The height and direction of mountain ranges is an important element in determining climate. If the ranges are perpendicular to the prevailing winds and of a considerable height, they drain the winds of much of their

moisture, thus causing to places to leeward colder winters and hotter summers, by partially removing their protecting screen of vapor, and exposing them more completely to solar and terrestrial radiation.

Rainfall.—Whatever tends to lower the temperature of the air below the dew-point is a cause of rain. It is therefore to the winds we must chiefly look for an explanation of the rainfall, and the broad principles of the connection may be stated to be these five:—(1) when the winds have previously traversed a considerable extent of ocean, the rainfall is moderately large; (2) if the winds advance at the same time into colder regions, the rainfall is largely increased, because the temperature is sooner reduced below the point of saturation; (3) if the winds, though arriving from the ocean, have not traversed a considerable extent of it, the rainfall is not large; (4) if the winds, even though having traversed a large extent of ocean, yet on arriving at the land proceed into lower latitudes or regions markedly warmer, the rainfall is small or nil; (5) if a range of mountains lies across the onward path of the winds, the rainfall is largely increased on the side facing the winds, and reduced over the region on the other side of the range. The reason here is that the air on the windward side of the ridge being suddenly raised to a greater height in crossing the range, the temperature is further reduced by mere expansion, and a more copious precipitation is the result; whereas on the leeward side as the air descends to lower levels it becomes gradually drier, and accordingly the rainfall rapidly diminishes with the descent.

West of the Rocky Mountains the rainfall is very unequally distributed, the annual amounts varying from eighty-six inches at Astoria, near the mouth of the Columbia river, to eight inches at San Diego on the coast, and three inches at the head of the Gulf of California. Over the whole of the region between the Cascade and Rocky Mountains the rainfall at all seasons is extremely small, this being indeed the feature in the climate to which the formation of the cañons of that region is chiefly to be referred. On the other hand, in the United States and Canada to east of longitude 100° W., the distinguishing feature of the rainfall is the comparative equableness of its distribution, an annual rainfall exceeding fifty inches occurring only over restricted districts, and a rainfall as low as twenty inches being scarcely met with anywhere. The regions where the rainfall exceeds fifty inches are Florida, the lower basin of the Mississippi, and the Atlantic seaboard of Nova Scotia and Newfoundland.

In January the annual maximum rainfall occurs over the whole of the west coast from Sitka to lower California; but in the interior between longitude 120° and 95° W., the amount is everywhere small, and over a considerable part in the southwest of this region no rain falls. The region of largest rainfall extends from Louisiana to West Virginia, where the mean varies from four to six inches. Over nearly the whole of the Dominion of Canada, by much the greater part of the winter precipitation is in the form of snow, which has been carefully measured and recorded by the Meteorological Service. The average snowfall for January exceeds thirty inches at St. John's, Newfoundland, in Anticosti, Prince Edward Island, and in many other regions.

In July the rainfall is everywhere small in the west, a large part of this extensive region being absolutely rainless. The remarkable dryness of the climate at this season is due to the northwest winds that set in toward the low pressure of the interior, which thus blow toward warmer regions. The rainfall to the east of the Rocky Mountains is distributed by the winds which are con-

nected with the low-pressure region of the interior and with the high-pressure region of the Atlantic. The result is two regions of larger rainfall—the one in the southeast of the States and the other to the west of the lakes. The summer winds of the southeastern coasts are southerly, and as they are anticyclonic in their origin and have in their course traversed some extent of ocean, they arrive well, but not super-saturated, and pour down a rainfall in July of six inches and upward along the coasts and for some distance inland from Louisiana to Chesapeake Bay. Further, since in July these winds attain their maximum force and persistency, the rainfall at the same time reaches the maximum along the whole coast from Boston to some distance west of New Orleans. Since the summer winds blow in the line of the Alleghany mountains and not across them, the rainfall diminishes in ascending their slopes. The comparative equableness of the rainfall over the eastern States is the necessary result of the winds' passing into higher latitudes, and, therefore, cooler regions. A broad region where the rainfall is less than on each side of it, extends from Michigan to the southwest as far as Canadian River. To the west of the lakes the rainfall rises above four inches, and, since over this region the winds become somewhat easterly as they flow toward the low-pressure area, it is probable that the larger rainfall of this prairie region has its origin in no small degree in the evaporation of the lakes. On ascending the higher reaches of the Mississippi, the amount diminishes, but scarcely falls lower than two inches, being thus analogous to the summer rains of the Upper Ganges. On crossing the water-parting into the basin which drains into Hudson's Bay, we encounter east and northeast winds laden with vapor licked up in their passage over Hudson's Bay, which they distribute in a generous rainfall of probably three to five inches over the rising colonies of Manitoba and Saskatchewan. An important point in the climate of the States is that over nearly the whole of the extensive region stretching between the Alleghanies and Rocky Mountains, except the south coast already referred to, the annual maximum rainfall does not occur in summer, but in spring, the month of largest rainfall in the great majority of cases being May. In the basin of Hudson's Bay July is the month of largest rainfall.

Snow takes the place of rain when the temperature is sufficiently low to freeze the condensed moisture in the atmosphere. Snow is composed of crystals, either six-pointed stars or hexagonal plates, which exhibit the greatest variety of beautiful forms, one thousand different kinds having been observed. These numerous forms Scoresby reduced to five principal varieties: (1) thin plates, comprising several hundred forms of the most exquisite beauty; (2) a nucleus or plane figure, studded with needle-shaped crystals; (3) six-sided, more rarely three-sided, crystals; (4) pyramids of six sides; (5) prismatic crystals, having at the ends and middle thin plates perpendicular to their length. In the same snowfall the forms of the crystals are generally similar. The flakes vary from 0.07 inch to an inch in diameter, the smallest occurring with low temperatures and the largest when the temperature approaches 32° . If the temperature is a little higher, the snow-flakes are partially thawed in falling through it, and fall as sleet. The white color of snow is caused by the combination of the different prismatic colors of the minute snow-crystals. The density of snow is far from uniform; it is generally from ten to twelve times lighter than an equal bulk of water, but varies from eight to sixteen times lighter than water.

The limit of the fall of snow near sea-level coincides roughly with the winter isothermal of 52° , since in

places where the mean winter temperature is no higher than 52° that of the air falls occasionally to 32° or lower during the winter months. As regards Europe, the southern limit is about Gibraltar; in North America it is Savannah, New Orleans, the mouth of the Rio Grande, the head of the Gulf of California, and San Francisco.

The snow-line marks the height below which all the snow that falls annually melts during summer. No general rule can be stated for this height in different climates, owing to the many causes determining it. These are the exposure of mountain slope to the sun (and hence, other things being the same, it is higher on the south than on the north sides of mountains), exposure to the rain-bringing winds, the steepness of the mountains, and the degree of dryness of the air. Hence the position of the snow-line can be known by observation only. It falls only little on either side of the equator to latitude 20° ; from latitude 20° to 70° it falls equably, but from latitude 70° to 78° much more rapidly. To this general rule there are many exceptions. It is 4,000 feet higher on the north than the south side of the Himalayas, owing to the larger snowfall on the south, and the greater dryness of the climate of the north side, and therefore the greater evaporation from the snow there. It is higher in the interior of continents than near the coasts, because the precipitation is less and summer heat greater. In the Caucasus it is 11,063 feet high, but only 8,950 in the Pyrenees. In South America it rises from the equator to latitude 18° , and more on the west than on the east slopes of the Cordilleras, owing to the large precipitation on the east and small precipitation and arid climate of the west side of that chain of mountains. It is as high in latitude 33° south as in 19° north, but south of that latitude it rapidly sinks owing to the heavy rains brought by the moist northwest winds of these regions. In the south of Chili it is 3,000 feet lower than in the same latitudes in Europe, and 6,000 feet lower than in the extremely arid climates of the Rocky Mountains.

METHODISM. I. WESLEYAN METHODISM.—The history of Wesleyan Methodism embraces—(1) the Methodism of Oxford, which was strictly Anglican and rigidly rubrical, though it was also more than rubrical; (2) the evangelical Methodism of the Wesleys after their conversion (in 1738), of which the Wesleyan doctrines of conversion and sanctification were the manifesto and inspiration, while preaching and the class-meeting were the great motive and organizing forces—a movement which before Wesley's death had developed into a form containing, at least in embryo, all the elements of a distinct church organization, although in its general designation and deliberate claims it purported to be only an unattached spiritual society; and (3) Wesleyan Methodism since the death of Wesley, which, by steps at first rapid and afterward, though leisurely, distinct and consecutive, assumed an independent position, and has grown into complete development as a church.

Oxford Methodism began in November, 1729, when John Wesley, returning to Oxford from Lincolnshire, where he had been serving his father as curate, found that his brother Charles, then at Christ Church, had induced a few other students to join him in observing weekly communion. John Wesley's accession lent weight and character to the infant association. Their first bond of association, besides the weekly communion, was the common study of the Greek Testament, with which they joined regular fasting, the observance of stated hours for private devotion, the visitation of the sick, of the poor, and of prisoners, and the instruction of neglected children. They never themselves adopted any common designation, but of the variety of derisive

names they received from outsiders that of "Methodists" prevailed—a sobriquet the fitness of which, indeed, as descriptive of one unchanging and inseparable feature of Wesley's character (which he impressed also on his followers), was undeniable.

This first Oxford Methodism was very churchly. Between 1733 and 1735, however, a new phase was developed. Its adherents became increasingly patristic in their sympathies and tendencies, and Wesley came much under the influence of William Law.

It was in 1736, during his residence in Georgia, whither he had gone as a missionary of the Propagation Society, that he learnt those lessons. When he returned to England he had already accepted the doctrine of "salvation by faith," although he had not as yet learned that view of the nature of faith which he was afterward to teach for half a century. He had, however, as in the journal of his homeward voyage he tells us, learned, "in the ends of the earth," that he "who went to America to convert others was never himself converted to God." In this result his Oxford Methodism came to an end.

2. Methodism after Wesley's Conversion.—John Wesley landed at Deal, on his return from Georgia, on February 1, 1738. His journals on the homeward voyage, says Miss Wedgwood, "chronicle for us that deep dissatisfaction which is felt whenever an earnest nature wakes up to the incompleteness of a traditional religion; and his after life, compared with his two years in Georgia, makes it evident that he passed at this time into a new spiritual region." * * * "By Peter Böhler, in the hands of the great God," he writes in his journal, "I was, on March 5th, fully convinced of the want of that faith whereby we are saved." This "conviction" was followed on March 24th of the same year (1738) by his "conversion."

Like most good men of that age in England, Wesley, before he came under the influence of his Moravian teacher, had regarded faith as a union of intellectual belief and of voluntary self-submission—the belief of the creeds and submission to the laws of Christ and to the rules and services of the church, acted out day by day and hour by hour, in all the prescribed means and services of the church and in the general duties of life. From this conception of faith the element of the supernatural was wanting, and equally that of personal trust for salvation on the atonement of Christ. The work of Böhler was to convince Wesley that such faith as this, even though there might be more or less of divine influence unconsciously mingling with its attainment and exercise, was essentially nothing else than an intellectual and moral act or habit, a natural operation and result altogether different from the true spiritual faith of a Christian. This conviction led him a few days afterward to stand up at the house of the Rev. Mr. Hutton, College street, Westminster, and declare that five days before he had not been a Christian. When warned not thus to despise the benefits of sacramental grace, he rejoined, "When we renounce everything but faith and get into Christ, then, and not till then, have we reason to believe that we are Christians." It is true that for several years after this he remained High-Church in some of his principles and opinions, but nevertheless his ritualism was dead at the roots.

This experience also made Wesley an evangelist. He had a forgotten gospel to preach—the gospel by which men were to be converted, as he had been, and to be made "new creatures." And this result, this new birth, was not dependent on any churchly form or ordinance, on any priestly prerogative or service, or on any sacramental grace or influence. To raise up, accordingly, by his preaching and personal influence, a

body of converted men, who should themselves become witnesses of the same truth by which he had been saved, was henceforth to be Wesley's life-work. This was the inspiration under which he became a great preacher; this also made him an organizer of his living witnesses into classes and societies. In the pulpit was the preaching power; in the class-room was the private and personal influence. The vital link between the pulpit and the class meeting was the doctrine and experience of "conversion." Thus Wesleyan Methodism is derived, not from Wesley the ritualist, but from Wesley the evangelist.

Wesley's doctrines offended the clergy. His popularity as a preacher alarmed them. The churches were soon shut against him. He attended the religious meetings—on a Church of England basis—which had existed in London and elsewhere for fifty years, so far as these were still open to him, the Moravian meetings, and meetings in the rooms of private friends, but these were quite insufficient for the zeal and energy of himself and his brother, who had been "converted" a few days before himself. Accordingly, in 1739, he followed the example set by Whitefield, and preached in the open air to immense crowds. In the same year also he yielded to the urgency of his followers and to the pressure of circumstances, and, becoming possessed of an old building called "the Foundery," in Moorfields, transformed it into a meeting-house. Here large congregations came together to hear the brothers.

The religious societies through which the Wesleys, after their conversion, exercised at first their spiritual influence were in part, as has been intimated, Moravian—that in Fetter Lane, of which the rules were drawn up by Wesley himself in 1738 (May 1), being the chief of these—and in part societies in connection with the Church of England, the successors of those which sprang up in the last years of the Stuarts, as if to compensate for the decay of Puritanism within the church. In 1739, however, a strong leaven of antinomian quietism gained entrance among the Moravians of England (Böhler himself having left for America in the spring of 1738); and Wesley, after vainly contending for a time against this corruption, found it necessary formally to separate from them, and to establish a society of his own, for which a place of meeting was already provided at the Foundery. This was the first society under the direct control of Wesley, and herein was the actual and vital beginning of the Wesleyan Methodist Society, that is, of Wesleyan Methodism. Hence the Wesleys celebrated their centenary in 1839. It was not, however, till 1743 that Wesley published the rules of his society.

Wesley called his society, when he published the "Rules" in 1743, the "United Societies." His brother's name was joined with his own at the foot of these rules, in their second edition, dated May 1, 1743, and so remained in all later editions while Charles Wesley lived. Those rules are still the rules of Wesleyan Methodism. Since Wesley's death they have not been altered. During his life only one change was made of any importance. In 1743 the offerings given weekly in the classes were for the poor, there being at that time no Conference and no itinerant preachers except the two brothers; after a few years the rules prescribed that the weekly contributions were to go "toward the support of the gospel."

In 1739 these societies were not divided into "classes." But in 1742 this further step in organization was taken, and the change is recognized in the rules of 1743. Leaders were appointed to these classes, and became an order of spiritual helpers and subpastors, not ordained like lay elders in the Presbyterian churches, but, like

them, filling up the interval between the pastors that "labor in the word and doctrine" and the members generally. What would to-day be called the "unsectarian" character of his society was, indeed, in Wesley's view, one of its chief glories. All the time, however, this "unsectarian" society was only another "sect" in process of formation. Wesley for many years before his death had seen that, unless the rulers of the church should come to adopt in regard to his society a policy of liberal recognition, this might be the outcome of his life-work. And it would seem as if in his private confidences with himself he had come in the end at times to acquiesce in this result.

Still more decisive, however, was the third step in the development of Wesley's "Society." The clergy not only excluded the Wesleys from their pulpits, but often repelled them and their converts from the Lord's Supper. This was first done on a large scale, and with a systematic harshness and persistency, at Bristol, in 1740. Under these circumstances the brothers took the decisive step of administering the sacrament to their societies themselves, in their own meeting-rooms, both at Bristol and at Kingswood.

In 1741 Wesley entered upon his course of calling out lay preachers, who itinerated under his directions. To the societies founded and sustained with the aid of these preachers, who were entirely and absolutely under Wesley's personal control, the two brothers, in their extensive journeys, administered the sacraments as they were able. The helpers only ranked as laymen, many of them, indeed, being men of humble attainments and of unpolished ways.

In 1744 Wesley held his first Conference. The early Conferences were chiefly useful for the settlement of points of doctrine and discipline and for the examination and accrediting of fellow-laborers. They met yearly. Conferences were a necessity for Wesley, and became increasingly so as his work continued to grow upon him. It was inevitable also that the powers of the Conference, although for many years the Conference itself only existed as it were on sufferance, and only exercised any authority by the permission of its creator and head, should continually increase. The result was that in 1784 Wesley could no longer delay the legal constitution of the Conference, and that he was compelled, if he would provide for the perpetuation of his work, to take measures for vesting in trustees, for the use of "the people called Methodists," under the jurisdiction of the Conference as to the appointment of ministers and preachers, all the preaching places and trust property of the Connection. The legal Conference was defined as consisting of one hundred itinerant preachers named by Wesley, and power was given to the "legal hundred" continually from the first to fill up the vacancies in their own number, to admit and expel preachers, and to station them from year to year, no preacher being allowed to remain more than three years in one station.

By this measure Wesley's work was consolidated into a distinct religious organization, having a legally corporate character and large property rights.

In 1784, the American colonies having won their independence, it became necessary to organize a separate Methodism for America, where Methodist societies had existed for many years. Wesley gave formal ordination and letters of ordination to Doctor Coke, already a presbyter of the Church of England, as superintendent (or bishop) for America, where Coke ordained Francis Asbury as presbyter and superintendent (or bishop), and Coke and Asbury together ordained the American preachers as presbyters. From that ordination dates the ecclesiastical commencement of American Episcopal

Methodism—in which the bishops are only chief among the presbyters whom they superintend, superior in office but of the same order. The Episcopal Methodism of America represents to-day the largest aggregate of Protestant communicants and worshipers of the same ecclesiastical name to be found in any one nation in the world.

At the time of Wesley's death there were in Great Britain, the Isle of Man, and the Channel Islands 19 circuits, 227 preachers, and 57,562 members. In Ireland there were 29 circuits, 67 preachers, and 14,006 members. There were also 11 mission circuits in the West Indies and British America, 19 preachers, and 5,300 members. The number of members in the United States was returned as 43,265.

3. *Wesleyan Methodism after Wesley's Death (1791).* When Wesley died the Conference remained as the bond of union and fountain of authority for the Connection. But between the meetings of Conference Wesley had acted as patriarch and visitor with summary and supreme jurisdiction. The first need to be supplied after his death was an authority for the discharge of this particular function. In America Wesley had organized a system of bishops (presbyter-bishops), presbyters or elders, and deacons or ministers on probation. Among some of those preachers who had been most intimate with Wesley there was a conviction that his own judgment would have approved such a plan for England. No document, however, remains to show that such was his desire. The preachers, in their first Conference after Wesley's death, instead of appointing bishops, each with his diocese or province, divided the country into districts, and appointed district committees to have all power of discipline and direction within the districts, subject only to an appeal to the Conference, all the preachers exercising equal rights also in the Conference, the "legal hundred" merely confirming and validating *pro forma* the resolutions and decisions of the whole assembly.

At first the preachers stationed in the districts were instructed to elect their own chairmen, one for each district. But the plan was speedily changed, and the chairmen were elected each year by the whole Conference; and this method has been maintained ever since. The "district meetings"—as they are generally called—are still "committees" of the Conference, and have *ad interim* its power and responsibilities as to discipline and administration. Originally they were composed exclusively of preachers, but before many years had passed circuit stewards and district lay officers came to be associated with the preachers during the transaction of all the business except such as was regarded as properly pastoral.

The relation of the Conference to the government of the Connection having thus been determined, the question which next arose, and which occupied and indeed convulsed the Connection for several years (1792-95), was that of the administration of the sacraments, especially of the Lord's Supper, to the societies. The societies generally insisted on their right to have the sacraments from their own preachers. Many of the wealthier members, however, and in particular a large number of the trustees of chapels, opposed these demands. At length, between 1794 and 1795, after more than one attempt at compromise had been made by the Conference, the feeling of the societies as against the trustees became too strong to be longer resisted, and accordingly at the Conference of 1795 the "plan of pacification" was adopted, the leading provision being that, wherever the majority of the trustees of any chapel, on the one hand, and the majority of the stewards and leaders, on the other, consented to the administration of the sacra-

ments, they should be administered, but not in opposition to either the one or the other of these authorities. In England the Lord's Supper was always to be administered after the Episcopal form; in Scotland it might still, if necessary, be administered, as it had commonly been before, after the Presbyterian form. In any case, however, "full liberty was to be left to give out hymns and to use exhortation and extemporary prayer." The result was that within a generation the administration of the sacraments to the societies came to be the universal rule. By this legislation the preachers assumed the powers of pastors, in accordance, however, only and always with the desire and choice of their flocks. No formal service or act of ordination was brought into use till forty years afterward. All preachers on probation for the ministry, after the completion of their probation, were "received into full connection" with the Conference, this reception implying investment with all pastoral prerogatives. Modern Methodism has developed more fully and conspicuously the pastoral idea.

No sooner was the sacramental controversy settled than the further question as to the position and rights of the laity came to the front in great force. A comparatively small party, led by Alexander Kilham, imported into the discussion ideas of a republican complexion, and demanded that the members in their individual capacity should be recognized as the direct basis of all power, that they should freely elect the leaders and stewards, that all distinction in conference between ministers and laymen should be done away (elected laymen being sent as delegates from the circuits in equal number with the ministers), that the ministry should possess no official authority or pastoral prerogative, but should merely carry into effect the decisions of majorities in the different meetings. In the course of a very violent controversy which ensued, pamphlets and broadsheets, chiefly anonymous, from Kilham's pen, advocating his views and containing gross imputations on the ministers generally, and in particular on some not named but distinctly indicated, were disseminated through the societies. The writer was tried at the Conference of 1796, condemned for the publication of injurious and unjustifiable charges against his brethren, and by a unanimous vote expelled from the Conference. In the following year he founded the "New Connection," the earliest of the organized secessions from Wesleyan Methodism.

By the settlement now described the outlines of Methodism as an organized church were fairly completed. Many details have since been filled in, and many changes have been made in secondary arrangements, but the principles of development have remained unchanged. The Connection after 1797 had a long unbroken period of peaceful progress. The effect of the "Kilhamite" separation, indeed, was after 1797 not greatly felt by the parent body. The number of Methodists in the United Kingdom in 1796, the year of Kilham's expulsion, was, 95,226; in 1797, it was 99,519; in 1798 the New Connection held its first conference, and reported 5,037 members, the number of the parent body being 101,682. Nor was it till 1806 that the New Connection reached 6,000.

The development of the pastoral position and character of the ministers of the body after 1797 could not but advance on a line parallel to the development of the position and claims of the laity. In 1818 the usage of the Conference was conformed to what had long been the ordinary unofficial custom, and the preachers began to be styled in the *Wesleyan Methodist Magazine* and in other official publications "Reverend," a fact which may seem trivial, but which in reality was of important significance.

In 1834, after the idea had been long entertained and the project had been repeatedly discussed, it was determined to establish a theological institution for the training of ministerial candidates. There are now four colleges, with two hundred and fifty students. In 1836 the practice of ordination by imposition of hands was adopted.

Such advances, however, as these in the general organization and development of the Connection, and especially in the status and professional training of the ministers, could not be made in such a body without offense being given to some, whose tendencies were to disallow any official distinction between the ministry and the laity, and who also objected to the use of the organ. This leveling element was strong in the West Riding of Yorkshire, and in 1828, on the placing of an organ in Brunswick Chapel, Leeds, by the trustees, with the consent of the Conference, a violent agitation broke out. The consequence was a disruption, the first since 1798, under the title "Protestant Methodists." But this was absorbed, some years later, in a more considerable secession.

The decision of the Conference in 1834 to provide a college for the training of ministerial candidates gave special offense to the malcontents. Such an occasion was all that was wanting for the various discontents of the Connection to gather to a head. The demands made by the agitators proceeded on a basis of democratic ecclesiasticism such as it is very difficult to apply successfully to a system of associated churches. The result was a third secession, based on the same general ground of ecclesiastical principles as the two preceding, which was organized in 1836, and with which the "Protestant Methodists" eventually coalesced. This new secession was known first as the "Wesleyan Methodist Association;" but for a number of years past it has been merged in a still larger body of seceders designated "The Methodist Free Churches." Its leader at the first was the Rev. Dr. Warren, who left it, however, not many months after it was formed, and took orders in the Church of England.

The controversies of 1835-36 left their mark on the legislation and official documents of the Connection. The principles of 1797 remained intact, some farther guards only being added to prevent any danger of hasty or irresponsible action on the part of superintendents, and at the same time "minor district meetings" were organized in order to facilitate appeals. One error was, however, committed by the Conference. In 1797 no provision had been made for bringing the circuit, through its quarterly meeting, into direct relations with the Conference. In 1836 a right of direct memorial to the Conference was given to the circuit quarterly meeting; but it was so fenced round with conditions and limitations as to make it practically inoperative, and at the same time provocative of suspicion and irritation.

The effect of the secession of 1836 on the general progress of the Connection was not great. The number of members reported in 1835 in Great Britain and Ireland was 371,251 (there being a decrease in England of 951), in 1836 381,369, in 1837 384,723. For the next ten years the advance of the Connection in numbers and in general prosperity was apparently unprecedented. The Centenary Fund of 1839-40 amounted to £221,000. In the midst, however, of all the outward prosperity of Methodism—partly perhaps in consequence of it—very perilous elements were at work. The revolutionary ideas of the Chartist period (1840-48) and of Continental politics (1848-49) reacted on Wesleyan Methodism as the political ideas of 1791 and of 1831 had done at those epochs. The embers of old controversies—ecclesiastical, quasi-political, and personal—still smoldered, and

at length burst into fresh flame. In 1849 the internal dissensions reached their climax. In that year James Everett, the chief author of the discontent, and two other ministers, Samuel Dunn and William Griffith, who had identified themselves with him, were expelled. A disastrous agitation followed. No distinct secession took place till after the Conference of 1850. The union of the "Methodist Free Churches," in which was incorporated the "Wesleyan Association" (of 1836), was formed by the seceders. The "New Connection" also received some thousands of the seceders into its ranks. But by far the greatest part of those who left went with neither of these bodies.

Between 1850 and 1855 the Connection in Great Britain and Ireland lost 100,000 members, and not till 1856 did it begin to recover. In that year the numbers were returned as 282,787, showing a small increase over the preceding year. Since then peace and unity have prevailed unbroken.

In doctrine all branches of Methodism are substantially identical. Wesley's doctrines are contained in fifty-three sermons known as the "four volumes" and in his *Notes on the New Testament*. The Conference has, however, published two catechisms, one for younger, the other for older children, of which a new and carefully revised edition has lately been completed. In general, Wesleyan theology is to be described as a system of evangelical Arminianism. In particular, Wesleyan divines insist on the doctrines of original sin, general redemption, repentance, justification by faith, the witness of the spirit, and Christian perfection—or, as it has been customary for Methodists to say, the doctrines of a "present, free, and full salvation." By the witness of the Spirit is meant a consciousness of the Divine favor through the atonement of Jesus Christ. Wesleyans have often been represented as holding the Calvinistic doctrine of "assurance." The word, however, is not a Wesleyan phrase, and assurance, so far as it may be said to be taught by Methodists, signifies, not any certainty of final salvation, but merely a "sense of sin forgiven."

II. AMERICAN EPISCOPAL METHODISM.

The beginnings of American Methodism are traceable to the year 1766, when a few pious emigrants from Ireland introduced Methodism into New York. On receiving an appeal, in 1768, from the New York Methodists, who were engaged in building a preaching-house, Wesley laid the case of America before the Conference at Leeds in 1769, and two preachers, Boardman and Pilmoor, volunteered to go to the colonies. Boardman went to New York, Pilmoor to Philadelphia. In 1771 two other Methodist itinerants, Francis Asbury—the most famous name in American Methodism—and Richard Wright came out to America. In 1773 Thomas Rankin, a preacher of experience sent out by Wesley, held the first Conference in Philadelphia, when there were ten itinerant preachers and 1,160 members. After the breaking out of the War of Independence the English Methodist preachers were unpopular, and all but Francis Asbury went back to England. At the end of the war, however, in 1784, Wesley sent out Doctor Coke, and American Methodism was organized as an independent church, with Doctor Coke and Francis Asbury as its presbyter-bishops. The history of American Methodism since that period is too vast and complicated for any attempt to be made to summarize it here. Methodism is more properly national in its character as an American church than any church in the country. In Massachusetts and some other of the New England States it is less powerful than Congregationalism, which still retains there much of its ancient predominance; in the city of New

York it is less powerful than Presbyterianism, and, indeed, occupies a position generally less influential than might have been expected. But in Philadelphia it is very powerful; so also in Baltimore and in Cincinnati; if not strong in New York city, it is very strong in the State; and generally throughout the Western and Midwestern States it is the prevalent form of faith and worship. In the South, also, it is more powerful than any other church. American Methodism is Episcopal. But its Episcopacy is neither prelatical nor diocesan. The bishops are superintending presbyters, and they visit the whole territory of Methodism in rotation, holding (presiding over) the annual Conferences. These Conferences are purely ministerial. But the General Conference, which meets once in four years, and which is the Conference of legislation and final appeal, is mixed and representative. The first General Conference was held in 1792, the first delegated or representative Conference in 1812, the first mixed or ministerial-and-lay General Conference in 1872. There were till lately no district assemblies in the Episcopal Methodism of America, and now there are but few. The bishops maintain the unity of the Connection in the interval between the General Conferences, by their visitation and by their conjoint council. A sub-episcopal class of ministers also, called presiding elders, supplement the action and superintendency of the bishops. These preside over districts, holding all the circuit quarterly meetings, and holding the district meetings, if any such meetings have been organized. American Episcopal Methodism is distributed into five distinct sections or churches, which, however, differ from each other in no points of any importance as respects organization or discipline, still less doctrine. The American Methodist Episcopal Church South became a separate organization in 1847 by reason of the slavery controversy. The colored churches, of which there are three, sprang up distinctly from local causes. The following are the latest available statistics:

	Itinerant Minist's	Local Preach's	Lay Members
Methodist Episcopal Church.....	12,142	12,323	1,717,567
" " " South.	4,004	5,868	837,832
African " " 	1,832	9,760	391,044
Methodist Episcopal Zion Church..	1,650	3,750	300,000
Colored M. E. Church.....	638	683	112,000
	20,266	32,384	3,358,443

In the Methodist Episcopal Church alone there are 100 annual Conferences, visited by twelve bishops. This church has more than twenty universities, of which some are distinguished schools of learning. Boston University is one of the most recent and one of the chief. The principal foreign missions are in India, China, and Japan. The Methodist Church South also has some influential universities, particularly that at Nashville, and has missions, in particular in Japan and China.

Besides these Methodist Episcopal churches, with their total of 3,358,000 church members, there are two other churches which do not assume the name at all, but are yet essentially Methodist in doctrine and discipline, not varying in any important particulars from the Episcopal Methodism of America. Of these one is called the United Brethren, with 157,000 members, the other the Evangelical Association, with 113,000 members.

Non-Episcopal American Methodism.—The bodies included under this head are chiefly secessions from the original stock of American Methodism, founded on principles of democratic church government, analogous to those of the English Methodist secessions. The only

considerable body, however, is the Methodist Protestant Church, with 125,000 members. The minor bodies, four in number, count all together less than 60,000 members, the principal being the American Wesleyan Church, with 25,000 members.

METHODIUS, the apostle of the Slavs, was a native of Thessalonica, and was born about the year 825. His nationality is unknown, but most probably he was a Græcized Slav; the family of which he was a member appears to have been one of considerable social distinction, and he himself had already attained high official rank in the government of Macedonia before he determined to abandon his secular career and embrace the monastic life. His younger brother Constantine (better known as Cyril, the name he adopted at Rome shortly before his death) had also distinguished himself as a secular "philosopher" in Constantinople before he withdrew to the cloister and to solitude. Constantine died in Rome, but Methodius, after satisfying the pope of his orthodoxy and obedience, went back to his labors in "Moravia" as archbishop of Pannonia. His province appears to have been, roughly speaking, coextensive with the basins of the Raab, Drave, and Save, and thus to have included parts of what had previously belonged to the provinces of Salzburg and Passau. The date of the death of Methodius is variously given; the most trustworthy tradition says that it took place on April 6, 885.

METHYL, a chemical term which until lately was used in two radically different senses, namely, as designating either the atom-group CH_3 , which in numberless chemical formulæ figures as a "radical" or a gaseous substance of the same composition, which, however, nowadays is generally called "dimethyl," to distinguish it from the radical.

Methyl-Alcohol.—This substance, in ordinary practice, is never made synthetically, but simply extracted from wood-spirit, a commercial substance which is produced industrially in the dry distillation of wood. The wood-spirit is contained in the aqueous portion of the tar produced in this operation, along with acetic acid. To recover both, the tar-water is neutralized with lime and distilled, when the acetate remains, while the spirit distils over, along with a deal of water, which, however, is easily removed, as far as necessary, by redistillation and rejection of the less volatile parts. The "crude" wood-spirit, as thus obtained, is not unlike in its general properties to ordinary spirits of wine, from which, however, it is easily distinguished by its abominable smell. The ordinary commercial article, besides a variable percentage of water, contains from 35 to 80 per cent. of methyl-alcohol; the rest consists chiefly of acetone.

Pure methyl-alcohol is a colorless liquid similar in its general properties, in its behavior to other chemically inert liquids, and in its action as a solvent, to ordinary absolute alcohol, from which, however, it differs by the entire absence from it of all spirituous odor. A preparation which smells of wood-spirit may be condemned at once as impure.

METRONOME, an instrument for denoting the speed at which a musical composition is to be performed. Its invention is generally, but falsely, ascribed to Johann Nepomuk Maelzel, a native of Ratisbon (1772–1838). It consists of a pendulum swung on a pivot; below the pivot is a fixed weight, and above it is a sliding weight that regulates the velocity of the oscillations by the greater or less distance from the pivot to which it is adjusted. The silent metronome is impelled by the touch, and ceases to beat when this impulse dies; it has a scale of numbers marked on the pendulum, and the upper part of the sliding weight is placed under that number which is to indicate the quickness of a stated note.

METSU, GABRIEL, a Dutch painter of celebrity (born in 1630, died after 1667), is one of the few artists of renown in Holland whose life has remained obscure.

METTERNICH, CLEMENS WENZESLAUS, PRINCE, first minister of Austria from 1809 to 1848, was the son of a Rhenish nobleman employed in high office by the Austrian court. He was born at Coblenz in 1773. At the age of fifteen he entered the university of Strasbourg. The French Revolution was then beginning. Metternich was an aristocrat and a conservative by birth and nature. His marriage, in 1795, with the Princess Kaunitz, a granddaughter of the famous minister, fixed him in the highest circle of Austrian nobility. His first contact with the great political world was at the congress of Rastadt in 1798, where, under the auspices of the victorious French republic, arrangements were made for compensating the German princes and nobles whose possessions on the left bank of the Rhine had been ceded to France by the peace of Campo Formio. In 1801 Metternich was appointed Austrian ambassador at Dresden, and in 1803 he was promoted to Berlin; but he had hardly become as yet a prominent man in Europe. His stay at Berlin was the turning-point of his life. The war of the third coalition was impending. Austria united with England and Russia against Napoleon, and the task of the youthful ambassador was to win over the court of Berlin to the cause of the allies. Metternich seems to have done all that it was possible for him to do; but Prussia persisted in its neutrality. The earnestness with which Metternich had worked against France did not prevent him from remaining on the friendliest terms with M. Laforest, the French ambassador at Berlin; and so agreeable an account of him was transmitted to Paris by his rival that, at the close of the conflict, Napoleon himself requested that Metternich might henceforward represent Austria at the Tuileries. Metternich was accordingly sent to Paris in 1806.

The sudden overthrow of Prussia, and the alliance between France and Russia which was made at Tilsit in 1807, added immeasurably to the difficulties of the court of Vienna. It became clear that Napoleon was intending to dismember Turkey, and to gain for himself some part of the spoils of the Ottoman empire. Metternich's advice was that Austria should endeavor to detach the czar from the French alliance, and by this means frustrate the plans of partition; but, should Russia hold fast to Napoleon, that Austria itself should unite with the two aggressors, and secure its share of Turkey. Oriental affairs, however, fell into the background, and in the summer of 1808 Metternich was convinced that Napoleon was intending to attack Austria, though not immediately. He warmly supported Count Stadion's policy in raising the forces of Austria to the highest strength; and, although he did not share in the minister's hopes in a general rising throughout Germany, he expressed in his dispatches no distrust of the power of Austria to cope with Napoleon. This is the more singular because, after the disastrous issue of the campaign of 1809, Metternich seems to have taken credit for having opposed the policy of war. Napoleon again captured Vienna; the battle of Wagram was lost; and after a long negotiation Austria had to purchase peace by the cession of part of Austrian Poland and of its Illyrian provinces. Metternich, who had virtually taken Count Stadion's place immediately after the battle of Wagram, was now installed as minister of foreign affairs. The first striking event that took place under his administration was the marriage of Marie Louise, daughter of the emperor Francis, to his conqueror Napoleon. Metternich seems, in spite of his denials, to

have been the real author of the family union between the houses of Hapsburg and Bonaparte, which guaranteed Austria against danger from the east, at the same time that it gave it at least some prospect of security from attack by Napoleon, and enabled Metternich to mature his plans for the contingency of an ultimate breach between France and Russia. In 1812 this event occurred. Metternich, in nominal alliance with Napoleon, sent a small army into southern Russia, allowing it to be understood by the czar that the attack was not serious. Then followed the annihilation of the French invaders. While Prussia, led by its patriots, declared war against Napoleon, Metternich held his hand, merely stating that Austria would no longer regard herself as a subordinate ally, but would act with all her force on one side or the other. The result of the reserve was that Metternich could impose what terms he pleased on Russia and Prussia as the price of his support. The armies of these two powers, advancing into central Germany, proved no match for the forces with which Napoleon took the field in the spring of 1813; and the hard-fought battles of Lützen and Bautzen resulted in the retreat of the allies. After the combatants had made an armistice, Metternich tendered Austria's armed mediation, requiring Prussia to content herself with the restoration of her territory east of the Elbe, leaving Napoleon's ascendancy in Germany almost untouched. Napoleon, after a celebrated interview with Metternich, madly rejected terms so favorable that every Prussian writer has denounced Metternich's proposal of them as an act of bitter enmity to Prussia. On the night of August 10th the congress of Prague, at which Austria, as armed mediator, laid down conditions of peace, was dissolved.

Austria declared war against Napoleon. The battle of Leipsic and the campaign of 1814 in France followed, Metternich steadily pursuing the policy of offering the most favorable terms possible to Napoleon, and retarding the advance of the allied armies upon the French capital. Metternich had nothing of that personal hatred toward the great conqueror which was dominant both in Prussia and in England; on the contrary, though he saw with perfect clearness that, until Napoleon's resources were much diminished, no one could be safe in Europe, he held it possible to keep him in check without destroying him, and looked for the security of Austria in the establishment of a balance of power in which neither Russia nor France should preponderate, while Prussia should be strictly confined within its own limits in northern Germany. The assistance of the Austrian army, which was no doubt necessary to the allies, had, so far as related to Prussia, been dearly purchased. When, at the beginning of 1813, Prussia struck for the freedom of Germany, its leading statesmen and patriots had hoped that the result of the war of liberation would be the establishment of German unity. It was no part of Metternich's policy to allow anything so revolutionary as German unity to be established, least of all under the influence of Prussian innovators. He made treaties with the king of Bavaria and Napoleon's other German vassals, guaranteeing them, in return for their support against France, separate independence and sovereignty when Germany should be reconstructed. Accordingly, though the war resulted, through Napoleon's obstinate refusal of the terms successively offered to him, in the limitation of France to its earlier boundaries and in a large extension of Prussia's territory, the settlement of Germany outside Prussia proceeded upon the lines laid down by Metternich, and the hopes of unity raised in 1813 were disappointed. A German confederation was formed, in which the minor sovereigns retained supreme power within their own states, while

the central authority, the federal diet, represented, not the German nation, but the host of governments into which the nation was divided. Metternich advised the emperor Francis of Austria to decline the old title of German emperor, disliking any open embodiment of the idea of German unity. In this unprogressive German policy Metternich was completely successful. His great opponent, Stein, the champion of German unity and of constitutional systems, abandoned his work in despair, and refused the useless post of president of the diet, which Metternich offered to him.

The second branch of Metternich's policy in 1813-14 was that which related to Italy. Following the old maxims of Austrian statesmanship, Metternich aimed not only at securing a large territory beyond the Alps, but at making the influence of Austria predominant throughout the Italian peninsula. The promises of national independence which had been made to the Italians when they were called upon to rise against Napoleon were disregarded. In the secret clauses of the first treaty of Paris the annexation of both Lombardy and Venetia was guaranteed to Austria, and the rest of Italy was divided into small states as of old. Napoleon's return from Elba led to the downfall of Murat, who had been allowed to retain the kingdom of Naples, and the reunion of that country with Sicily, under the Bourbon Ferdinand. After the second overthrow of Napoleon, Metternich endeavored to make every Italian sovereign enter into a league under Austria's presidency. Ferdinand of Naples accepted the position of vassal, but the pope and the king of Sardinia successfully maintained their independence. With the construction of the German federation, and the partial construction of an Italian federation, both under Austria's guidance, the first part of Metternich's career closes. He had guarded Austria's interests with great skill during the crises of 1813 and 1814.

The second part of Metternich's career, which extends from 1815 to 1848, is that of a leader of European conservatism. It is difficult to describe his attitude toward almost all the great questions which were now arising as any but one of absolute blindness and infatuation. He acknowledged that exceptional circumstances in the past had made it possible for England to exist under a constitution; he knew that France would not surrender the *Charta* given to it by King Louis XVIII.; but in all other great states he maintained that there were no alternatives but absolute monarchical government and moral anarchy. His denunciations of liberals and reformers everywhere and at all times are perfectly childish; and in many instances his hatred of change led him into errors of judgment not surpassed in the annals of political folly. When Napoleon fell, there was a prospect of the introduction of constitutional government throughout a great part of Europe.

Metternich's advice, tendered with every grace of manner and with the most winning and persuasive art, was indeed not hard for rulers to accept, for he simply recommended them to give up nothing that they had got. It was at the congress of Aix-la-Chapelle (1818) that the retrograde tendency, which was now succeeding to the hope of 1815, first gained expression. An agitation among the students of the German universities had caused some scandal in the previous year, and secret societies had just been discovered in Russia. A few months later the murder of Alexander's German agent, Kotzebue, by a fanatical student, gave Metternich an excellent pretext for organizing a crusade against German liberty. A conference of ministers was held at Carlsbad. The king of Prussia allowed his representative to follow Metternich's lead. The resistance of the constitutional minor states proved of no avail; and a

series of resolutions was passed which made an end of the freedom of the press throughout Germany, and subjected the teaching and the discipline of the universities to officers of state. The king of Prussia broke his promise of establishing a national representation, and satisfied his conscience by creating certain powerless provincial diets, exactly as Metternich had recommended him. Throughout Germany at large a system of repression was carried out against the advocates of constitutional right. The press was silenced; societies were dissolved; prosecutions became more and more common. While Metternich imagined himself to be stifling the spirit of discontent, he was in fact driving it into more secret and more violent courses, and convincing eager men that the regeneration of Germany must be sought not in the reform but in the overthrow of governments.

Meanwhile revolution broke out in Spain and Italy. Ferdinand of Spain, who had restored despotism, was compelled, in March, 1820, to accept the constitution of 1812, which he had subverted. The same constitution was accepted a few months later by Ferdinand of Naples. Spain was outside Metternich's range, but his hand fell heavily upon Naples. A congress of the great powers was held at Troppau in October, 1820. Metternich, who was president, as he had been at Vienna, and continued to be in later congresses, completely won over the czar to his own views. Resolutions in favor of an intervention, if necessary by force of arms, against the Neapolitan liberal government were adopted by Austria, Russia, and Prussia, though England and France held aloof. A letter was concocted by Metternich for King Ferdinand to send to his subjects, informing them that the powers would not permit the constitution to exist, and that, in default of their submission, the allied courts would employ force. The British Government, while protesting against the joint action of the three powers as an assumption of international sovereignty, was perfectly willing that Austria, as a state endangered by Neapolitan revolution, should act on its own account. Metternich, however, continued to treat the Neapolitan question as the affair of Europe, and maintained his concert with Russia and Prussia. Early in 1821, an Austrian force, acting in the name of the allies, entered central Italy. The armies opposed to it collapsed, and the Austrians entered Naples on March 24th.

At the congress of Verona, held in 1822, the affairs of Spain were considered by the powers. In the end, the Spanish constitution was overthrown by a French invading army; but, though the arm employed was that of France, the principle of absolutism which animated the crusade was that which Metternich had made his own. A severe check, however, now met him in another quarter. Greece had risen against Turkish rule in 1821. Metternich's attitude toward the Greeks was for some time one of unqualified hostility. He reverted to the principle of maintaining Turkey at all costs against a Russian advance southward; and he attributed the Greek movement to the efforts of Russian agitators unauthorized by the czar. His desire was that the sultan should deprive Russia of all possible cause for complaint as regarded its own separate interests, and so gain freedom to deal summarily with the Greeks. Metternich's hopes failed, partly through the obstinacy of the Turks, partly through the wavering conduct of Alexander, and partly through the death of Castlereagh and the accession of Canning to power. It was in great part owing to Canning's moral support that Greece ultimately became an independent state; and the extraordinary violence of Metternich's language whenever he mentions this English statesman marks only too well the opposite character of his aims.

The Greek question, however, was only the first on which the judgment of events was now beginning to declare itself against Metternich and all his principles. The French revolution of 1830 shattered the moral fabric which he had so proudly inaugurated, and in great part himself raised, in 1815. The accord that grew up between England and France now made any revival of the kind of presidency that he had once held in Europe impossible. He was, indeed, bold and rapid in throwing troops into the papal territory when revolutionary movements broke out there in 1831 and 1832, though war with France seemed likely to result from this step. He was as unsparing as he had been in 1819 in suppressing the agitation which after 1830 spread from France to Germany; and the union of the three eastern courts was once more exhibited in the meeting of the monarchs, which took place at Münchengrätz in 1837, and in a declaration delivered at Paris, insisting on their right of intervention against revolution in other countries. It was, however, the new czar of Russia, Nicholas, who was now the real head of European conservatism; and the stubborn character, the narrow, unimaginative mind of this prince made it impossible for Metternich to shape his purposes by that delicate touch which had been so effective with his predecessor. But in Austria itself Metternich continued without a rival. In 1835 the emperor Francis, with whom he had worked for nearly thirty years, died. Metternich, himself falling into the mental habits of old age, remained at the head of the state till 1848. The revolution of that year ended his political career. He resigned office with the dignity of demeanor which had never failed him; his life was scarcely safe in Vienna, and the old man went for awhile to England, which he had not visited since 1794. Living on till June, 1859, he saw every great figure of his earlier life, and many that had appeared on the horizon since his own prime, pass away; and a few more months of life would have enabled him to see the end of that political order which it had been his life-work to uphold; for the army of Napoleon III. was crossing the Sardinian frontier at the moment when he died, and, before a second summer had gone, Victor Emmanuel had been proclaimed king of Italy.

METZ, the capital of German Lorraine, and one of the strongest fortresses in Europe, is situated at the confluence of the Moselle and the Seille, 80 miles to the northwest of Strasburg, and 190 miles to the east of Paris. It is the seat of a military governor, the judicial and administrative authorities of Lorraine, a Roman Catholic bishop, Protestant and Jewish consistories, and a chamber of commerce. The general appearance of the town is quaint and irregular, but there are also many handsome modern streets. The Moselle flows through it in several arms, crossed by fourteen or fifteen bridges. In the southwest corner of the town is the esplanade, an extensive open space commanding a fine view of the fertile "Pays Messin" around Metz. The most interesting of the ten city gates is the Porte d'Allemagne, a castellated structure erected in 1445, and still bearing traces of the siege of Charles V. Metz contains seven Roman Catholic churches, two Protestant churches, and a synagogue. The cathedral, with huge pointed windows, slender columns, and numerous flying buttresses, was begun in the thirteenth century, and finished in 1546, and belongs to the decadence of the Gothic style. The Gothic churches of St. Vincent and St. Eucharius, and the handsome garrison-church, completed in 1881, also deserve mention. Among secular buildings the most important are the large covered market, the town-hall, the palace of justice, the theater, the governor's house, and the various buildings for military purposes. The public library contains

35,000 volumes, including an extensive collection of works relating to the history of Lorraine. In the same building is the museum, which contains a picture gallery, a numismatic cabinet, and a collection of specimens of natural history. Metz also possesses several learned societies and charitable institutions, a gymnasium, three seminaries, and a military academy. The cemetery of Chambièrre contains the graves of 8,400 French soldiers who died here in 1870.

The commerce and industry of Metz have not yet entirely recovered from the blow inflicted by the withdrawal of French capital in 1871. The principal articles of manufacture are leather, coarse cloth and canvas, gunpowder, arms, needles, billiard tables, hats, and artificial flowers. There are several large iron-works in the neighborhood. The trade of Metz is chiefly carried on in leather, timber, wine, brandy, liquors, beer, preserved fruits, and hardwares. A large annual fair is held here. The civil population of Metz, which in 1869 amounted to 48,066, sank in 1872 to 33,134. Since then it has steadily increased, and is now 45,000, about half Germans. The garrison of Metz consists of 10,000 men, or, including the surrounding forts, nearly 16,000.

On the partition of the Carolingian realms in 843 Metz fell to the share of the western kingdom as the capital of Lorraine. Its bishops, whose creation reaches back to the fourth century, now began to be very powerful. Metz acquired the privileges of a free imperial town in the twelfth century, and attained great commercial prosperity. In 1552 it fell into the hands of the French through treachery, and was heroically and successfully defended against Charles V. by the young duke of Guise. It now sank to the level of a French provincial town, and its population dwindled from 60,000 to 22,000 (1698). At the peace of Westphalia Metz, with Toul and Verdun, was formally ceded to France, in whose possession it remained for upward of two centuries. In August, 1870, the successes of the German troops compelled Marshal Bazaine and the French army of the Rhine to seek shelter behind the fortifications of Metz, which was forthwith subjected by the Germans to a rigorous blockade. After an investment of ten weeks, during which not a single shot was fired at the town, Bazaine capitulated, surrendering to the victors an army of nearly 180,000 men, several hundred cannon, and an immense quantity of military stores of all kinds. By the peace of Frankfurt in 1871, Metz was again united to the German empire. Marshal F. F. von Steinmetz and Generals Cusine and Kellermann were natives of Metz.

As a fortress Metz has always been of the highest importance, and it now ranks with Strasburg as one of the two great bulwarks of the west frontier of Germany. The original town walls were replaced by ramparts in 1550, and the citadel was built in 1566. In 1674 the works were reconstructed by the celebrated military engineer Vauban. Under Napoleon III. the fortress was strengthened to meet the demands of modern warfare, and since 1871 the Germans have spared neither time nor money in completing and supplementing his plans. The present fortifications of Metz consist of two lines—an inner circle of bastions and ramparts inclosing the city itself, and an outer circle of large detached forts on the surrounding hills. The inner line is strengthened by two citadels, one of which is advanced as a tête-de-pont on the left bank of the Moselle. The outer circle consists of nine or ten large forts connected with each other by smaller fortifications and commanding all the approaches to the city.

MEULEN, ANTONY FRANCIS VAN DER, was called to Paris about 1666, by Colbert, at the instance of Le

Brun, to fill the post of battle painter to Louis XIV. Born in 1634, at Brussels, he had at an early age eclipsed his master Peter Snayers, and the works executed by him for the king of France during the campaigns of Flanders (1667) so delighted Louis that from that date Van der Meulen was ordered to accompany him in all his expeditions. In 1673 he was received into the French Academy, and attained the grade of councilor in 1681. He died at Paris in 1690.

MEURTHE-ET-MOSELLE, a department in the northeast of France, formed in 1871, out of those parts of the old departments of Meurthe and Moselle which continued French, and deriving its name from the two principal rivers which water it. Prior to 1790, it belonged to ancient Lorraine, or to one or other of the bishoprics of Toul, Metz, and Verdun. Population (1890), 420,000.

MEUSE, MAESE, or MAAS, a river of France, Belgium, and Holland, discharging into the North Sea or German Ocean, has a course (variously measured) of some 500 or 550 miles, about 300 miles lying within France.

MEUSE, a department in the northeast of France, formed out of a part of Lorraine and portions of the Three Bishoprics, the Clermontais, and Champagne, derives its name from the river by which it is traversed from south to north. More than half the surface of the department consists of culturable lands, one-fourth of forest, one-tenth of meadow land. The chief waterways are the canal connecting the Marne with the Rhine, and the canal of the Meuse; the two together have a length of 146 miles. The population of the department in 1881 was 289,861. Bar-le-Duc (population in 1881, 17,485) is the capital.

MEXICO. The name Mexico is connected with the name of the group of American tribes calling themselves *Mexica* (sing. *Mexicatl*), or *Azteca*. The word is related to or derived from the name of the Mexican national war-god Mexitl, better known as Huitzilopochtli. The Aztecs from the twelfth century appear to have migrated from place to place over the mountain-walled plateau of *Anahuac*, the country "by the water," so called from its salt lagoons, and which is now known as the valley of Mexico. About 1325 they founded on the lake of Tezcuco the permanent settlement of Mexico Tenochtitlan, which is still represented by the capital city Mexico. The name Mexico was given by the Spanish conquerors to the group of countries over which the Aztec power more or less prevailed at the time of the European invasion. Eventually Mexico and New Mexico came to designate the still vaster region of Spanish North America, which (till cut down by changes which have limited the modern republic of Mexico) reached as far as the Isthmus of Panama on the south and took in California and Texas on the north.

When, early in the sixteenth century, the Spaniards found their way from the West India Islands to this part of the mainland of America, they came in view of nations cultured high above the level they had hitherto met with in the New World, with organized armies, official administrators, courts of justice, high agriculture and mechanical arts, and stone buildings whose architecture and sculpture were often of dimensions and elaborateness to astonish the builders and sculptors of Europe. How a population of millions could inhabit a world whose very existence had been till then unknown to geographers and historians, and how its nation could have reached so high a grade of barbaric industry and grandeur, was a problem which naturally excited the liveliest curiosity of scholars, and gave rise to a whole literature.

Real information as to the nations of Mexico before

Spanish times is very imperfect, but not altogether wanting. The remarks made by the accurate and experienced observer Alexander von Humboldt, who had seen more American tribes than almost any traveler, are still entitled to the greatest weight. He considered the native Americans of both continents to be substantially similar in race-characters. Such a generalization will become sounder if, as is now generally done by anthropologists, the Eskimo with their pyramidal skulls, dull complexion, and flat noses are removed into a division by themselves. Apart from these polar nomads, the American indigenes group roughly into a single race or division of mankind, of course with local variations. If our attention is turned to the natives of Mexico especially, the unity of type will be found particularly close. The native population of the plateau of Mexico, mainly Aztecs, may still be seen by thousands without any trace of mixture of European blood. They are considerably like the Mongoloid peoples of North and East Asia (less so to the Polynesians); so that the tendency among anthropologists is now generally to admit a common origin, however remote, between the tribes of Tartary and of America. This original connection, if it may be accepted, would seem to belong to a long-past period, to judge from the failure of all attempts to discover an affinity between the languages of America and Asia. The original peopling of America may well date from the time when there was continuous land between it and Asia.

It would not follow, however, that between these remote ages and the time of the discovery of the New World by Columbus no fresh immigrants can have reached America. We may put out of the question the Scandinavian sea-rovers who sailed to Greenland about the tenth century, and appear afterward to have coasted New England (see AMERICA), but do not seem to have found their way far enough southward for their visit to have any effect on Mexico. But at all times communication has been open from East Asia and even the South Sea islands to the west coast of America. The importance of this is evident when we consider that Japanese junks now drift over by the ocean current to California at the rate of about one a year, often with some of the crew still alive. Further north, the Aleutian islands offer a line of easy sea passage, while in northeast Asia, near Behring's Strait, live Chukchi tribes who carry on intercourse with the American side; the presence of Eskimo in this part of Asia is so plainly due to local migration that it is neglected in comparing the languages of the two continents. Asiatics, such as Japanese or Kurile Islanders, if they found their way in small numbers to America and merged into native tribes, might hardly leave descendants distinguishable from the rest of the population even in the first generation, nor introduce their own language. What gives a more solid interest to the question of Asiatic influence in America is that, though neither the evidence of features nor of language has substantiated it, there are details of Mexican civilization which are most easily accounted for on the supposition that they were borrowed from Asia. They do not seem ancient enough to have to do with a remote Asiatic origin of the nations of America, but rather to be results of comparatively modern intercourse between Asia and America, probably since the Christian era. Humboldt compared the Mexican calendar with that in use in eastern Asia. Humboldt also discussed the Mexican doctrine, represented in the native pictures, of four ages of the world belonging to water, earth, air, and fire, and ending respectively by deluge, earthquake, tempest, and conflagration.

Actual documents of native Aztec history, or copies of them, are still open to the study of scholars, while after



MEXICO.

SCALE OF MILES.

50 0 50 100 150 200 250 300 350

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118° Rand, McNally, 114° & Co., Eng'rs., 112° Chicago.

110°

108°

106° Longitude

104° West from 102° Greenwich.

100°

98°

96°

94°

92°

90°

88°

the conquest interpretations of these were drawn up in writing by Spanish-educated Mexicans, and histories founded on them with the aid of traditional memory were written by Ixtlilxochitl and Tezozomoc. In Central America the rows of complex hieroglyphs to be seen sculptured on the ruined temples probably served a similar purpose up to the time of the Spanish invasion. The documents purporting to be histories, written down by natives in later times, thus more or less represent real records of the past, but the task of separating the preponderant mythical part from what is real history is of the utmost difficulty. Turning to the native chronicles of the Mexican nations, these are found to be substantial dated records, going back to the twelfth or thirteenth century, with some vague but not worthless recollections of national events from times some centuries earlier. These last-mentioned traditions, in some measure borne out by linguistic evidence of names of places, tribes, and persons, point to the immigration of detachments or branches of a widespread race speaking a common language, which is represented to us by the Aztec, still a spoken language in Mexico. To this nation is ascribed not only the oldest but the highest culture of the Nahua nations; to them was due the introduction of maize and cotton into Mexico, the skillful workmanship in gold and silver, the art of building on a scale of vastness still witnessed to by the mound of Cholula, said to be Toltec work; the Mexican hieroglyphic writing and calendar are also declared to have been of Toltec origin. With the Toltecs is associated the mysterious tradition of Quetzalcoatl, a name which presents itself in Mexican religion as that of a great deity, god of the air, and in legend as that of a saintly ruler and civilizer. His brown and beardless worshipers described him as of another race, a white man with noble features, long black hair and full beard, dressed in flowing robes. He came from Tullan or from Yucatan (for the stories differ widely), and dwelt twenty years among them, teaching men to follow his austere and virtuous life, to hate all violence and war, to sacrifice no men or beasts on the altars, but to give mild offerings of bread and flowers and perfumes, and to do penance by the votaries drawing blood with thorns from their own bodies. Legend tells stories of his teaching men picture-writing and the calendar, and also the artistic work of the silversmith; but at last he departed, some say toward the unknown land of Tlapallan, but others to Coatza-cualco on the Atlantic coast on the confines of Central America. Native tradition held that when Quetzalcoatl reached the Atlantic he sent back his companions to tell the Cholulans that in a future age his brethren, white men and bearded like himself, should land there from the sea where the sun rises, and come to rule the country. About 1430 took place the triple alliance of the Acolhua, Aztec, and Tepanec kings, whose capitals were Tezcuco, Mexico, and Tlacopan, the latter standing much below the other two. In fact the Aztecs now became so predominant that the rest of native history may be fairly called the Aztec period, notwithstanding the picturesque magnificence and intellectual culture which made Tezcuco celebrated under Nezahualcoyotl and his son Nezahualpilli. With the Spanish conquest under Hernando Cortes (see CORTES), the native history of Mexico comes to an end.

THE REPUBLIC OF MEXICO.

Mexico, Aztec *Mexitli* (Estados Unidos de Mexico), is a federal republic in North America, bounded north by the United States (California, Arizona, and New Mexico), east by Texas and the Gulf of Mexico, south by Guatemala and British Honduras, where the boundary lines

are still partly undetermined, west by the Pacific Ocean. Mexico stretches about 1,950 miles north-northwest and south-southeast, with a mean breadth of 400 miles. It has a coast-line of nearly 6,000 miles—about 4,200 on the Pacific and 1,600 on the Atlantic. The seaboard is little varied, either by deep inlets, bold headlands, broad estuaries, or large islands. On the west side are the vast Gulf of California, in outline somewhat resembling the Red Sea, and so named by some of the early navigators, and the open Bay of Tehuantepec, besides the smaller inlets of Acapulco and San Blas, forming two of the finest harbors in the world, and almost the only safe ones in the republic. On the east side the coast is mostly beset by lagoons and sand-banks, with no good havens, Campeche, Vera Cruz, Tampico, and Matamoros being all little better than open roadsteads exposed to the fierce "nortes," or northeasterly gales, that sweep the Gulf of Mexico for a great part of the year. Of headlands the most prominent are Capes S. Lucas and Palms at the south extremity of Lower California, Corrientes south from San Blas, and Catoche in the northeast of Yucatan. Besides this peninsula, which projects north-northeast, the only other is that of Lower California, which projects south-southeast parallel to the mainland. The islands are few in number, and all of insignificant size, the most noteworthy being Tiburon and Angel de la Guarda in the Gulf of California, the uninhabited Revillagigedo group in the Pacific, and Cozumel off the Yucatan coast. Mexico comprises all together twenty-seven confederate states, two territories, and the Federal District, with areas, populations, and chief towns as under:

States.	Sq. Miles	Pop. in 1888	Chief Towns.
NORTHERN—			
Sonora	77,526	105,391	Hermosillo.
Chihuahua	89,269	298,073	Chihuahua.
Coahuila.....	59,290	177,797	Saltillo.
Nuevo Leon.....	25,090	244,052	Monterey.
ATLANTIC—			
Tamaulipas	29,336	167,777	Cindad Victoria.
Vera Cruz	24,248	633,369	Jalapa.
Tabasco.....	9,843	114,028	S. Juan Bautista.
Campeche.....	20,844	91,180	Campeche.
Yucatan.....	28,178	275,506	Merida.
PACIFIC—			
Sinaloa.....	36,180	223,684	Culiacan.
Jalisco.....	27,261	1,161,709	Guadalajara.
Colima	2,704	69,547	Colima.
Michoacan.....	23,160	801,913	Morelia.
Guerrero.....	22,863	331,827	Chilpancingo.
Oaxaca	28,775	793,419	Oaxaca.
Chiapas.....	29,722	269,710	San Christobal.
CENTRAL—			
Durango.....	42,526	265,931	Durango.
Zacatecas.....	25,227	526,066	Zacatecas.
Aguas Calientes.	2,895	121,726	Aguas Calientes.
San Luis Potosi.	25,987	546,447	San Luis Potosi.
Guanajuato..	12,545	1,007,116	Guanajuato.
Queretaro.....	3,937	213,525	Queretaro.
Hidalgo.....	7,735	494,212	Pachuca.
Mexico	8,284	778,969	Toluca.
Morelos.....	1,650	151,540	Cuernavaca.
Puebla.....	12,738	839,468	Puebla.
Tlaxcala.....	1,506	147,988	Tlaxcala.
Federal District..	463	451,246	Mexico.
Lower California..	59,907	34,668	La Paz.
Tepic.....	11,580	102,166	Tepic.
Total	751,269	11,487,210	

Mexico forms a vast table-land, somewhat in the shape of a cornucopia, with its narrow end tapering to the south-southeast, its convex and concave sides facing the Pacific and Atlantic respectively, and with a general inclination northward. Most of the so-called Cordilleras are merely the "cumbres" or escarpments of this plateau, which falls abruptly toward the Atlantic, and through a series of well-marked terraces (formerly

lacustrine basins) toward the Pacific. Thus the carriage road from the capital runs in tolerably easy stages successively through the Tetla (8,000 feet), Mescala (5,500), Papagallo (1,800), and Peregrino (1,600) valleys down to Tepes within forty miles of the seaport of San Blas. But the southern central plateau of Anahuac maintains its mean elevation of 7,000 to 8,000 feet almost everywhere to within thirty-five to forty miles of the Atlantic. Hence the railway opened in 1872 between Vera Cruz and the capital has had to be carried by tremendously steep gradients to a height of nearly 8,000 feet within a total distance of 263 miles. The general but gradual northerly tilt of the table-land is shown by the altitudes of the capital, Durango, Chihuahua, and Paso del Norte on the United States frontier, which are respectively 7,600, 6,630, 4,600, and 3,800 feet.

The most continuous range is the Sierra Madre of the Pacific, which may be traced at a mean elevation of over 10,000 feet from Oajaca to Arizona, and which from Guadalajara to the northern frontier is crossed by no carriage route. Parallel to this is the Lower Californian range (Sierra de la Giganta, 3,000 feet), which, however, falls abruptly eastward, like the Atlantic escarpments. The Californian peninsula seems to have been detached from the mainland when the general upheaval took place which produced the vast chasm now flooded by the Gulf of California. Corresponding with the Sierra Madre of the Pacific on the west are the more interrupted eastern scarps of the central plateau, which sweep round the Gulf of Mexico as the Sierras Madres of Nuevo-Leon and Tamaulipas at an elevation of about 6,000 feet. These are crossed by the carriage routes from Tula to Tampico (highest pass 4,820 feet), from Saltillo to Monterey (3,400), and at several other points.

Of the central cross ridges the most important orographically and historically is the Cordillera de Anahuac which surrounds the Mexican (Tenochtitlan) and Puebla valleys, and which is supposed to culminate with Popocatepetl (17,853 feet) and Ixtaccihuatl (15,705). East of Popocatepetl are Citlaltepētē, better known as the Peak of Orizaba (17,176 feet), seventy miles inland, and San Martín or Tuxtla (9,708 feet) on the coast south of Vera Cruz, to which correspond on the west the recently upheaved Jorullo (4,000 feet) in Michoacan, Colima (12,800) near the coast in Jalisco, and the volcanic Revillagigedo group in the Pacific. South of this line, and nearly parallel, are the Sierras of Guerrero, and south of the Tehuantepec isthmus those of Oajaca and Soconusco toward the Guatemala frontier. In the same direction run the islands of Cuba and Hayti, which probably belong to the same Central-American system.

The rivers are almost useless for irrigation purposes, and available as means of communication only for short distances in their lower reaches, where they flow through the narrow alluvial strips of level coast-lands to the sea. Even the Rio Grande del Norte, which is by far the largest, and which forms the frontier line between Mexico and Texas, is navigable by large vessels only for a few miles above its port of Matamoras. The Rio Grande de Santiago, the largest on the Pacific side, is almost everywhere obstructed by falls and rapids. None of the lakes are of great size except Lake Chapala, which is traversed by the Rio Grande de Santiago, and has a reputed area of about 1,300 square miles.

In the higher ranges the prevailing formations are granites, which seem also to form the foundation of the plateaus, above which rise the traps, basalts, mineral-bearing porphyries, and more recent lavas. Igneous rocks of every geologic epoch certainly to a large extent form the superstructure of the central plateau.

Climate and Agriculture.—In the plateau region, or *tierras templadas*, the climate is almost that of perpetual spring, and the atmosphere remarkably free from moisture. It is to this peculiar dryness that the city of Mexico, the soil of which has been soaked with the filth of centuries, and never properly drained, owes its immunity from pestilence; but, on the other hand, throughout the plateau agriculture is dependent on the use and control of water for irrigation purposes, and an immense desert tract extends between Chihuahua and Zacatecas. Wood in all this upland region is scarce and dear, though there are valuable forests in the extreme north and south. On the coast-lands wood and water are abundant, and the soil fertile, but the climate is such that white men cannot work as laborers there. Yet Mexico contains as fine agricultural land as any in the world, and in most parts two crops a year are grown; while already a score of agricultural colonies, drawn from various nationalities, have been established in the country. Northern Mexico is the original home of the "cattle range" business, and there vast herds of horses, cattle and sheep form the principal wealth of the people. The coast belt and the terraces up to 3,000 feet constitute the *tierras calientes*, where the temperature ranges from 60° to 110° F., and, in the south at least, the magnificent tropical vegetation and the yellow fever and *vomito* reign with equal vigor. Two or three hours by the Vera Cruz Railway carries the traveler from Esperanza, at the very edge of the plateau, down into the heart of the tropics. The cold lands, or *tierras frias*, embrace all the country above 8,000 feet, including the few highest peaks covered with perpetual snow. South of about 28° N. there are only the wet and dry season, the former from June to October. Farther north there are four seasons; but in the highest zone the rainfall is very scanty, and northern Mexico and the Californian peninsula especially are exposed to seasons of drought. The vegetation of Mexico has the same wide range as the climate. In the lowlands dye-woods and valuable timbers abound in the virgin forests, as well as medicinal plants, india-rubber, palms, etc.; and oranges and bananas, many varieties of cactus, olives, sugar, coffee, cocoa, rice, indigo, cotton and tobacco, besides the omnipresent maize, all thrive. Many of these products, including the palms, oranges, cacti, olives, tobacco, and of course the maize, grow as readily over a great part of the temperate zone, where the characteristic vegetation embraces pines, evergreen oaks, the maguey or *Agave americana* and the henequen (*Agave sisilana*). The last two are nearly as frequent also in the *tierras frias*. The vine flourishes in some districts, especially near El Paso, Durango, and Parras in Coahuila, where a good wine is made; and mulberry plants have been imported from Europe to develop the silk industry. In Lower California a good deal of Archil is collected, and *chicle* gum is extracted and prepared in the forests along the coast. But agriculture in Mexico is very poorly developed. Primitive methods are followed by the people generally, and the American plow has only in a few localities displaced the crooked stick, sometimes shod with iron, and lashed by raw-hide thongs to the oxen's horns. There is, however, some agricultural machinery in use on the larger *haciendas*, or great landed estates. To their absentee owners such estates, in spite of the expense of irrigation and the shiftless methods in use, are said to return large incomes; but the difficulty and cost of transport are so great that in many parts of Mexico no more corn is grown than suffices to meet the wants of the immediate neighborhood. Of maize 128,222,000 bushels were raised in 1888. The other principal crops for the same year were wheat, 11,114,000.

000 bushels; beans, 7,547,000 bushels; barley, 5,787,000 bushels. The value of the cotton crop averages \$9,000,000, of sugar cane \$7,000,000, of hemp and coffee above a third as much, and of tobacco a fourth. In 1889 henequen was exported from Yucatan to the value of over \$5,000,000.

Minerals.—Mexico is rich in minerals, many of which have been worked from an early date. Silver-mining, especially, has been an important industry ever since the conquest, and a considerable number of the mines are still worked at a profit. Gold, though to a greatly less value, is also produced. The comage records, which date from 1537, and may be taken as substantially accurate, show the production of the precious metals from that year to 1884 to have been: Gold, \$114,384,204; silver, \$3,105,979,022—total, \$3,220,363,226. Copper is largely mined in some sections, being found in a pure state in Chiapas and Guanajuato, and elsewhere associated with gold. Other important minerals are iron, including enormous masses of meteoric iron ore, and the mountain a mile from Durango, the Cerro de Mercado, a solid mass of magnetic iron ore; lead, found associated with silver; and sulphur, zinc, quicksilver, platinum, cinnabar, asphalt and petroleum, besides salt, marble, alabaster, gypsum, and rock-salt in great quantities. There are also said to be large deposits of coal, some of excellent quality, in various localities; but as yet little of it has been mined. Throughout Mexico over 100,000 workmen are employed in the various mining enterprises—above 350 in number, and largely supported by American and British capital. Formerly the Mexican ores, especially argentiferous lead, were sent for smelting to the United States; but as the American tariff became prohibitive, establishments were set up on Mexican soil, to which in 1890 some American foundries and works also were transferred.

Manufactures and Trade.—In all Mexico the number of factories using steam power does not greatly exceed one hundred. Very little labor-saving machinery of any kind has been introduced, owing partly to the scarcity of fuel and water, and partly to the difficulty of repairing expensive and complicated machinery, usually—on the haciendas at any rate—broken on purpose by the peons, who are obstinately opposed to any change. In 1888 there were 93 cotton and 16 woolen factories in Mexico, besides 7 paper-mills and 2 potteries employing steam. Flour and unrefined sugar are also prepared, and a large sugar refinery was erected at Linares in 1890; while there are smaller special manufactures, such as candles, glass, porcelain; and the extraction of henequen fibre, too, is an important industry. Bounties are offered by some states for the establishment of factories within their bounds. But the handicraft production of such articles as pottery, saddles, sandals, many coarser textiles, the national hat, the sombrero, and the national drinks, pulque, mescal, and tequila, all from the various plants of the maguey family, is much more considerable. The great bulk of the Mexican exports is always formed by the precious metals—coin, bullion and ores; yet the amount of agricultural products and other merchandise has greatly increased since the construction of railways. Of these in 1860 there were none; in 1880 there were 655 miles, in 1890 over 5,500 miles open for traffic. The rapid construction of these lines, most of which are in English hands, has saddled the country with heavy responsibilities; the subventions payable to the several companies in the year 1890 amounted to \$3,500,000—about one-seventh of the government's total income—and the sum increases yearly, in accordance with agreements entered into with the companies. Moreover,

the spread of the railways has been made an excuse for the almost utter neglect of the roads, which throughout Mexico were bad enough before. The fine highways constructed by the Spaniards were allowed to fall into destruction during the long civil wars, and their present deplorable condition makes them rather a hindrance than a help in the development of the country. A still more serious obstacle to internal commerce is the crushing system of interstate customs—the *alcabalas*—a heritage from the days of Spanish rule; they were abolished by a decree of 1886, but in 1890 the British minister reported that they still existed under various names in the territories and federal district, and in most of the states. Under the excise system, moreover, nearly every possible product, every branch of industry, every social function, even, is taxed; and a swarm of petty officials in every city, town and hamlet see that nothing escapes its tax, from a bag of seaweed or shavings to a funeral or fandango. In 1890 the fiscal *gendarmaria* alone cost four-fifths as much as the foreign office and the judicial power together. Still, in spite of these impediments, the trade of Mexico within recent years has steadily increased. During the period of 1884–89 the imports advanced from \$35,819,000 to \$44,500,000, and the exports from \$46,553,380 to \$60,158,423. Of the exports in 1889 the precious metals represented \$38,785,275; henequen, coffee, hides, woods, tobacco, and vanilla came next. Nearly two-thirds of the total trade is with the United States, and one-fourth with Great Britain; France follows at some distance, and Germany yet further behind. Home manufactures and the distribution of merchandise are largely in the hands of foreigners. Of late years a large number of French merchants have settled in Mexico, and have nearly everywhere superseded the Germans, who controlled most of the trade from 1850 to 1870. In 1888 there were 12,300 French in the republic, and only 800 Germans, and the former had practically monopolized the dry-goods business of the country, and were pressing their rivals closely in other departments, such as hardware, in which the Germans had secured the lead. The entire foreign debt of Mexico was in 1890 returned at \$52,000,000. In the same year banking facilities were greatly extended, charters being granted for banks of issue and others in various towns; whereas previously banking had been confined almost entirely to two large banks at the capital, and their branches. In 1890 there were 32,437 miles of telegraphs and 4,349 of telephones.

Education has made marked progress since the final separation of church and state in 1857. In that year the old university of Mexico, a purely ecclesiastical institution after the model of Salamanca and the Sorbonne, was abolished, or rather was replaced by special schools of law, medicine, letters, agriculture, mines, sciences, fine arts, and commerce, and a military college. These, as well as numerous lower schools, including 200 in the capital alone, are all maintained by the state, while national schools are supported by public grants in all the large towns, and higher institutions in the capitals of the several states. There are in all nearly 5,000 public schools, besides establishments for the deaf and dumb, the blind, and juvenile delinquents, and numerous charitable foundations maintained by voluntary contributions.

Roman Catholicism, which under the Spanish rule was alone tolerated, continued after the separation to be the state religion until 1857. Since then, while all churches enjoy equal protection, none are officially recognized. The great majority of the *Indios fideles*, mestizoes, and creoles still adhere, at least outwardly, to the Roman Church, which is administered by a hier

rarchy of three archbishops (Mexico, Morelia, and Guadalajara) and twelve bishops. But by the organic laws of 1856 and 1859 all ecclesiastical estates, at one time comprising over one-third of the soil, were nationalized, the regular clergy suppressed, and their monasteries, together with all other superfluous ecclesiastical structures, appropriated by the state. During the last few years American Protestant missions have claimed some partial success, and the so-called "Church of Jesus," an undenominational body of a somewhat original type, has found a number of adherents, especially on the Anahuac table-land. But the *Indios bravos*, or uncivilized aborigines, everywhere follow the old spirit worship, while the Christianity of the Fideles is little more than a cloak for the continuous practice of the former Aztec heathenism.

Mexico constitutes at present a confederation of states modeled on that of the United States, and administered according to the constitution of 1857 as amended in 1873-74. By popular suffrage are chosen the president, the upper house (fifty-two members), and the supreme judiciary for four years, and the lower house (two hundred and twenty-seven members) for two years. The senate, abolished in 1853, was restored in 1874, the chief justice is *ex officio* vice president. The federal states, which are divided into a number of administrative districts, enjoy full autonomy in all local matters. The several constituencies are modeled on that of the central government, and like it comprise three departments—legislative, executive, and judicial. Each state is represented in the federal congress in the proportion of one member for every 80,000 inhabitants, and in the federal senate by two members elected by suffrage in the local congress. All external affairs and questions of general interest are reserved for the central government. The constitution as now established thus represents in theory the complete overthrow of mediævalism, and the absolute triumph of the new ideas which in the Old World are still in so many places struggling for the ascendancy.

Taking the whole population at less than 10,000,000, its ethnical distribution appears to be at present as under:—

1. Full-blood Indians.....	5,000,000
2. Mestizoes (half-caste Indians and whites)	3,000,000
3. Creoles (whites of Spanish descent).....	1,500,000
4. Gachupines (Spaniards by birth).....	50,000
5. Other Europeans and Americans.....	100,000
6. Full-blood negroes.....	10,000
7. Zambos or "Chinos" (Indo-Africans)	45,000
8. Mulattoes (Eurafricans).....	5,000

Under the Spanish administration, which was marked on the surface by few stirring events, such as warlike expeditions, civil strife, or serious internal troubles, Mexico, or New Spain, formed a viceroyalty at one time stretching from the isthmus of Panama to Vancouver's Island. Antonio de Mendoza, appointed in 1535 after government by *audiencias* had proved a signal failure, was the first of sixty-four viceroys who ruled with almost autocratic power, but scarcely any of whom has left a name in history.

But down to the early years of the present century all emoluments in church and state, most of the large plantations, of the mines, and of the commerce of the country, continued to be monopolized by the privileged gachupines, whom the creoles and mestizoes had already begun to regard as aliens. Hence the first reactionary movements, stimulated by Napoleon's deposition of King Ferdinand and arrest of the viceroy Hurri-garay in 1808, were aimed rather against odious class distinctions and the intolerable oppression of these aliens than against the abstract rights of the Spanish crown. The long smoldering spirit of discontent at

last broke into open revolt in 1810 at Guanajuato, under the leadership of Don Miguel Hidalgo. After his defeat and execution in 1811, the struggle was continued by Morelos, who, like Hidalgo, was a priest, and shared his fate in 1815. But he had already called a national assembly at Chilpanzinco, and by this body Mexican independence was for the first time proclaimed in 1813. A guerrilla warfare kept the national spirit alive till a fresh stimulus was given to it by the Spanish revolution of 1820. Under the leadership of the "Liberator" Iturbide, Mexican independence was again proclaimed on February 24, 1821, and the same year the capital was surrendered by O'Donoju, the last of the viceroys. But even after the revolt had thus been crowned with success a change of *personnel* rather than of system was contemplated; nor was Iturbide proclaimed emperor until the Mexican crown had been declined by a royal prince of Spain.

Almost simultaneously with this event the republican standard had been raised by Santa Anna at Vera Cruz (December, 1822). Thus the nation had no sooner got rid of foreign rule than it became torn by internal dissension. But henceforth the struggle is not so much against the privileged classes as between Conservative and Liberal principles—the former represented chiefly by the church and the superstitious populace, the latter by the more enlightened but not less unscrupulous sections of the community. From both the *Indios Bravos*, that is, about a third of the population, hold entirely aloof, and take advantage of the public disorders to continue their aggressive warfare against all alike. Events now follow in quick succession, and as many as 300 successful or abortive revolutions are recorded during the brief but stormy life of Mexican national independence. But amid the confusion of empires, republics, dictatorships, and military usurpations, succeeding each other with bewildering rapidity, the thoughtful student will still detect a steady progress toward the ultimate triumph of those Liberal ideas which lie at the base of true national freedom. A brief tabulated summary of the more salient incidents in this eventful struggle must here suffice:—

- 1821-23. Mexican independence acknowledged by Spain; regency under Iturbide, who (1822) is elected hereditary constitutional emperor; in December Santa Anna proclaims the republic in Vera Cruz.
- 1823-24. Provisional government; Iturbide abdicates; exiled, withdraws to London, but returning is shot (1824).
- 1824. First Liberal constitution—"Acta Constitutiva de la Federacion Mexicana," then comprising nineteen states and five territories; first president D. Felix Victoria, known as "Guadalupe Victoria."
- 1828-30. Contested presidencies of Pedraza, Guerrero, and Bustamante.
- 1835. Reaction of the church party; constitution of 1824 abolished; the confederate states fused in a consolidated republic under Santa Anna as president, but practically dictator.
- 1836. Texas, refusing to submit, secedes, defeats and captures Santa Anna.
- 1837. Santa Anna, returning, resumes office.
- 1839. Bravo's brief presidency followed by much anarchy.
- 1841-44. Santa Anna's first dictatorship with two others.
- 1844. Constitution restored with Santa Anna president; banished same year, he is succeeded by Cana-lizo.
- 1845. Herera president; disastrous war with United States to recover Texas.
- 1846. Santa Anna again president.

- 1848. Treaty of Guadalupe; California and New Mexico ceded to United States.
- 1853. Santa Anna's second dictatorship; treaty of Mexico (negotiated by Gadsden), ceding extensive territory to United States and reducing Mexico to its present limits; great financial embarrassment; "Plan of Ayutla;" flight of Santa Anna followed by universal chaos.
- 1855. Provisional Government under President Comonfort.
- 1856. Constitutional convention; radical reforms; rupture with Spain.
- 1857. Liberal constitution of March 11th; suspended December 1st; Comonfort dictator; the reaction supported by the church, large part of the army, and all Conservatives; opposed at Vera Cruz by Vice-President Benito Juarez at the head of the "Puros" or advanced Liberals; the "War of Reform" begins, and lasts till 1860.
- 1858-59. In the capital Comonfort is deposed by Zuloaga, who abdicates in favor of Miramon, general of the Conservative forces; but, declining the presidency, Miramon restores Zuloaga; British legation violated; in Vera Cruz the United States envoy McLean acknowledges Juarez, who introduces further Liberal measures.
- 1860. Capitulation of Guadalajara; flight of Miramon from the capital; triumph of the Liberals.
- 1861. Triumphal entry of Juarez into the capital; further radical reforms; marriage declared a civil contract; celibacy and ecclesiastical tribunals suppressed; confiscation of church property valued at £75,000,000 and over a third of the soil; final separation of church and state; Spain, France, and England urge claims for losses of their subjects resident in Mexico; convention of London; intervention of the allies, who occupy Vera Cruz in December.
- 1862. England and Spain withdraw, their claims having been settled by negotiation; war continued by France.
- 1863-64. The capital occupied by the French; Louis Napoleon dreams of a universal fusion of the Latin races; offers the Mexican imperial crown to the Austrian archduke Ferdinand Maximilian, who accepts, and arrives in June, 1864.
- 1867. After diverse issues the French withdraw; Maximilian abandoned to his fate, is captured and shot at Querétaro (June 19th).
- 1867-69. Various pronunciamientos by Santa Anna and others.
- 1871-72. Juarez president; he dies in office July, 1872; succeeded by his secretary, Lerdo de Tejada.
- 1873-74. The Liberal constitution of 1857, which had been twice suspended (1858-60 and 1863-67), is now largely amended, and continues to be henceforth the organic law of Mexico.
- 1876. Tejada succeeded by Porfirio Diaz.
- 1880. Manuel Gonzalez, president.
- 1884. Diaz again president.
- 1888. Diaz reelected.

THE CITY OF MEXICO.

Mexico, the capital formerly of the Aztec empire and of the Spanish colony of New Spain, and now of the republic, state, and federal district of Mexico, stands on the Anahuac plateau, 7,524 feet above sea-level, two and a half miles from the southwest side of Lake Texcoco (Texcoco), the lowest and largest of six basins filling the deepest depression in the hill-encircled Mexican valley. It is 173 miles by rail from Vera Cruz on

the Atlantic, 290 from Acapulco on the Pacific, 285 from Oajaca, 863 from Matamoras on the United States frontier. Mexico is the largest and finest city in Spanish America, forming a square nearly three miles both ways, and laid out with perfect regularity, all its 600 streets and lanes running at right angles north to south and east to west, and covering within the walls an area of about ten square miles, with a population (in 1890) of 300,000. Most of the inhabitants are pure-blood Indians or mestizoes; but the foreigners, chiefly French, English, Germans, Americans, and Spaniards, monopolize nearly all the trade, and as capitalists, bankers, merchants, and dealers, enjoy an influence out of all proportion to their numbers. A large portion of the natives are mendicants or vagrants, and the distinctly criminal element (26,470 in 1878) is kept in order by a police force of 1,320 men; and yet in that year there were as many as 5,370 knife-attacks and 3,250 robberies. The broad, well-paved, and gas-lit streets present a picturesque appearance with their quaint two and three storied stone houses gayly painted in white, red, yellow, or green, and terminating everywhere with a background of rugged sierras or snowy peaks which, owing to the bright atmosphere at this elevation, seem quite close, although really thirty or forty miles distant. All the main thoroughfares converge on the central Plaza de Armas (Plaza Mayor, or Main Square), which covers fourteen acres, and is tastefully laid out with shady trees, garden plots, marble fountains, and seats. Here also are grouped most of the public buildings, towering above which is the cathedral, the largest and most sumptuous church in America, which faces the north side of the plaza on the site of the great pyramidal teocalli or temple of Huitzilopochtli, titular god of the Aztecs.

The east side of the plaza is occupied by the old vice-regal residence, now the National Palace, with 675 feet frontage, containing most of the government offices (ministerial, cabinet, treasury), military headquarters, archives, meteorological department, with observatory, and the spacious hall of ambassadors with some remarkable paintings by Miranda and native artists. North of the National Palace, and apparently forming part of it, are the postoffice and the national museum of natural history and antiquities, with a priceless collection of Mexican remains. Close to the cathedral stands the Monte de Piedad, or national pawnshop, a useful institution, endowed in 1744 by Terreros with \$375,000, and now possessing nearly \$10,000,000 of accumulated funds. Facing the cathedral is the Palacio Municipal (city hall), 252 feet by 122, rebuilt in 1792 at a cost of \$150,000, and containing the city and district offices, the corporation jail, and the lonja, or merchants' exchange. Around the Plaza San Domingo are grouped the convent of that name, said to contain vast treasures buried within its walls, the old inquisition, now the school of medicine, and the custom-house. In the same neighborhood are the church of the Jesuits and the school of arts, an immense workshop, including iron and brass foundries, carriage and cart mending, building and masonry, various branches of joinery and upholstery work, and silk and cotton hand-weaving. Other noteworthy buildings are the national picture gallery of San Carlos, the finest in America, in which the Florentine and Flemish schools are well represented, and which contains the famous Las Casas, by Felix Parra; the national library of St. Augustine, with over 100,000 volumes, numerous MSS., and many rare old Spanish books; the mint, which since 1690 has issued coinage, chiefly silver, to the amount of nearly \$2,000,000,000; the Iturbide hotel, formerly the residence of the emperor Iturbide; the Mineria, or school of mines, with lecture-rooms, laborato-

ries, rich mineralogical and geological specimens, and a fossil horse three feet high of the Pleistocene period. Owing to the spongy nature of the soil, the Minería and many other structures have settled out of the perpendicular, thus often presenting irregular lines and a rickety appearance. Among the twenty scientific institutes, mention should be made of the Geographical and Statistical Society, whose meteorological department issues charts and maps of unsurpassed excellence.

Before 1860 half of the city consisted of churches, convents, and other ecclesiastical structures, most of which have been sequestered and converted into libraries, stores, warehouses, and even stables, or pulled down for civic improvements. Nevertheless there still remain fourteen parishes and thirty other churches, some of large size, with towers and domes, and their number has now been increased by six Protestant churches, including the Anglican cathedral in San Francisco street. This is the leading thoroughfare, and is rivaled in splendor only by the new Cinco de Mayo street, running from the National theater to the cathedral.

The city is supplied by two monumental aqueducts, from Chapultepec and the southwest, with good water at the rate of forty-four gallons per day per inhabitant.

Its industries are varied but unimportant, consisting chiefly of gold and silver work, coarse glazed and unglazed pottery of peculiar form and ornamentation, paper, feather-work remarkable for its taste and beautiful designs, toys, rosaries, crucifixes, religious pictures, lace and some weaving.

Mexico enjoys an equable climate, with a temperature varying from 70° to 50° F., but rendered unhealthy by the exhalations from the lakes and bad drainage. The chief public promenades are the Alameda, planted with stately beeches; the Vega, skirted by the Vega Canal, and adorned with the colossal bust of Guatemozin, the last of the Aztec emperors; the Paseo de la Riforma, a fine avenue three miles long, running south to the famous castle of Chapultepec, a place intimately associated with the names of both Montezuma and Maximilian.

Mexico dates either from the year 1325 or 1327, when the Aztecs, after long wanderings over the plateau, were directed by the oracle to settle at this spot. For here had been witnessed the auspicious omen of an eagle perched on a nopal (cactus) and devouring a snake. Hence the original name of the city, Tenochtitlan (nopal on a stone), changed afterward to Mexico in honor of the war god Mexitli. The city had reached its highest splendor on the arrival of the Spaniards in 1519, when it comprised from 50,000 to 60,000 houses, with perhaps 500,000 inhabitants, and seemed to Cortes "like a thing of fairy creation rather than the work of mortal hands."

MEXICO, a Missouri town, the capital of Audrain county, is a railroad center of considerable importance. It has banks, telegraphs, churches, schools, a high school, and a female college. A woolen factory and a plow factory are also located here. Population (1890), 4,789.

MEYERBEER, GIACOMO, musical composer, first known in Germany as Jakob Meyer Beer, was born at Berlin on September 5, 1791, of a wealthy and talented Jewish family. His early works were far from successful—his first opera, *Jephtha's Gelübde*, failing lamentably at Darmstadt in 1811, and his second, *Wirth und Gast (Almelek)*, at Vienna in 1814. At Venice he was so captivated by the style of Rossini that, renouncing all thought of originality, he produced a succession of seven Italian operas—*Romilda e Costanza*, *Semiramide riconosciuta*, *Edouardo e Cristina*, *Emma di Rosburgo*, *Margherita d'Anjou*, *L'Esule di Granata*, and *Il Crociato*

in *Egitto*—which all achieved a success as brilliant as it was unexpected. For several years after this he produced nothing in public; but, in concert with Scribe, he planned the work which first made known the reality of his transcendent genius—his first French opera, *Robert le Diable*. This gorgeous drama was produced at the Grand Opéra in 1831, and received with acclamation. Its popularity exceeded all previous expectation; yet for five years after this signal triumph Meyerbeer appeared before the public no more. In some respects his next opera, *Les Huguenots*, was greater, though it fell short of the deep romance which rendered *Robert le Diable* so incomparably captivating.

The first performance of *Les Huguenots* took place in 1836. After the production of *Les Huguenots* Meyerbeer again retired from public view, and spent many years in the preparation of two of his greatest works—the greatest of all except the two we have already mentioned—*L'Africaine* and *Le Prophète*. The libretti of both these operas were furnished by Scribe; and both were subjected to countless changes of detail before they satisfied the composer's fastidious taste; in fact, the story of *L'Africaine* was more than once entirely rewritten.

Meanwhile Meyerbeer accepted the appointment of kapellmeister to the king of Prussia, and spent some years at Berlin, where he produced *Ein Feldlager in Schlesien*, a German opera, in which the matchless cantatrice Jenny Lind made her first appearance in Prussia, with unprecedented success. Here also he composed, in 1846, the overture to his brother Michael's drama, *Struensee*. But his chief care at this period was bestowed upon the worthy presentation of the works of others. He began by presenting his dead friend Weber's *Euryanthe*, with scrupulous attention to the composer's original idea. With equal unselfishness he procured the acceptance of *Rienzi* and *Der Fliegende Holländer*, the first two operas of Richard Wagner, who, then languishing in poverty and exile, would, but for him, have found it impossible to obtain a hearing in Berlin. With Jenny Lind as prima donna and Meyerbeer as conductor, the opera flourished brilliantly in the Prussian capital; but the anxieties of this thankless period materially shortened the composer's life.

In 1854 he brought out *L'Étoile du Nord* at the Opéra Comique, and in 1859 *Le Pardon de Ploermel (Dinorah)*. His last great work, *L'Africaine*, was in active preparation at the Académie, when, on April 23, 1863, he was seized with a sudden illness, of which he died on May 2d.

MÉZIÈRES, a fortress of the first class, and the capital of the department of Ardennes, France, is 161 miles to the northeast of Paris by railway, on a peninsula of the Meuse, which almost entirely surrounds the town, and separates it from its more important suburb, Charleville.

MEZŐ-TÚR, a corporate town in the Cis-Tisian county of Jász-Nagy-Kun-Szolnok, Hungary, situated on the right bank of the Berettyó, and on the railway from Arad to Szolnok. In 1880 the population amounted to 20,649, mostly Magyars by nationality.

MEZZOFANTI, GIUSEPPE, cardinal, whose colloquial linguistic acquirements have become proverbial, was born September 17, 1774, at Bologna. He died at Rome, during the absence of the pontifical court at Gaeta, on March 15, 1849.

MEZZOTINT. See ENGRAVING.

MIAUTSE. The Miautse or Meaou-tsze of southern China are one of the aboriginal tribes of the country. At one time they occupied a considerable portion of the rich and fertile lands which now form the central province of the empire, but as the Chinese advanced

southward they were driven, like the Ainos in Japan and the Welsh in Britain, into the more inaccessible districts until they were compelled to seek refuge from the invaders in the mountain ranges, in the provinces of Yunnan, Kwei-chow, Kwang-se, and Kwang-tung, where they are found at the present day. In figure the Miautse, both men and women, are shorter and darker-complexioned than the Chinese, their faces also are rounder, and their features sharper. In disposition, too, they are very unlike their civilized neighbors. They are brave, passionate, suspicious, revengeful, and indifferent to cold and hunger; they are free and easy in their manners, and are as noisily joyous as the Chinese are grave and sedate.

MICAH (מִיכָה) is the short form of a name which in various modifications—*Micāiāhū*, *Micāiēhū*, *Micāiāh*—is common in the Old Testament, expressing as it does a fundamental point of Hebrew faith: Who is like Jehovah? The name was borne among others by the Danite whose history is given in Judges, xvii. *sq.*, by the prophet who opposed Ahab's expedition to Ramoth-Gilead, and by the subject of the present article, the contemporary and fellow-worker of Isaiah, whose name is prefixed to the sixth in order of the books of the minor prophets. He, it would appear from his writings, lived in the shephela or Judæan lowlands.

MICHAEL (מִיכָאֵל, "who is like God?") appears in the Old Testament as a man's name, synonymous with Micaiah or Micah. In the book of Daniel the same name is given to one of the chief "princes" of the heavenly host, the guardian angel or "prince" of Israel, and as such he naturally appears in Jewish theosophy as the greatest of all angels, the first of the four who surrounded the throne of God (see GABRIEL). It is as guardian angel of Israel, or of the church, the true Israel, that Michael appears in Jude 9 and Rev. xii. 7. In the Western Church the festival of St. Michael and All Angels (Michaelmas) is celebrated on September 29th.

MICHAEL, the name of several Byzantine emperors.

MICHAEL I. (Rhangabé) was an obscure nobleman who had married Procopia, the daughter of Nicephorus I., and been made master of the palace; his elevation to the throne was due to a revolutionary movement against his brother-in-law Stauracius, who reigned only two months after the death of Nicephorus on the battlefield (812). He died in 845.

MICHAEL II. (The Stammerer), a native of Amorium in Phrygia, was of humble origin, and began life as a private soldier, but rose by his talents and assiduity to the rank of general. He was one of those who had favored the election to the throne of his old companion in arms, Leo the Armenian, in 813, but, detected in a conspiracy against the government of that emperor, had been sentenced to death in December, 820; his partisans, however, succeeded in assassinating Leo on the morning of Christmas Day, and called Michael from the prison to the throne. He died in October, 829, and was succeeded by Theophilus, his son.

MICHAEL III. (The Drunkard) was the grandson of Michael the Stammerer, and succeeded his father Theophilus when only three years of age (842). Michael was assassinated in his palace in 867 by Basilus the Macedonian, whom he had associated with himself in the empire in the previous year.

MICHAEL IV. (The Paphlagonian) owed his elevation to Zoe, daughter of Constantine IX., the last of the Macedonian dynasty; this princess was married to Romanus III., but becoming enamored of Michael,

her chamberlain, she poisoned her husband and married her attendant (1034). He died on December 10, 1041.

MICHAEL V. (Calaphates or The Calker), nephew and successor of the preceding, derived his surname from his father Stephen, who had originally followed the occupation of a calker of ships. He owed his elevation (December, 1041) to his uncle John, whom along with Zoe he almost immediately banished; this led to a popular tumult and his dethronement after a brief reign of four months (April, 1042).

MICHAEL VI. (The Warlike) was already an old man when chosen by the empress Theodora as her successor shortly before her death in 1056. His government was feeble in the extreme, and he was at last compelled to abdicate by Isaac Comnenus, who had defeated his army in Phrygia (August, 1057).

MICHAEL VII. (Ducas or Parapinaces) was the eldest son of Constantine XI. Ducas, by whom, along with his brothers Andronicus I. and Constantine XII., he was invested with the title of Augustus; this joint succession took place in 1067, but in 1071 it suited the policy of the uncle Joannes Cæsar to make Michael sole emperor.

MICHAEL VIII. (Palæologus), born in 1234, was the son of Andronicus Palæologus Comnenus and Irene Angela, the granddaughter of Alexius Angelus, emperor of Constantinople. At an early age he rose to distinction, and ultimately became commander of the French mercenaries in the employment of the emperors of Nicæa. A few days after the death of Theodore Lascaris II. in 1259, Michael, by the assassination of Muzalon, succeeded to the guardianship, shared with the patriarch Arsenius, of the young emperor John Lascaris, then a lad of only eight years. Afterward invested with the title of "despot," he was finally proclaimed joint-emperor, and crowned alone at Nicæa on January 1, 1260. He died in Thrace, in December, 1282, and was succeeded by his son, Andronicus II.

MICHAEL IX. (Palæologus) was the son of Andronicus II., and was associated with him on the throne from 1295, but died before him (1320).

MICHAELIS, JOHANN DAVID, one of the most influential scholars and teachers of last century, belonged to a family which had the chief part in maintaining that solid discipline in Hebrew and the cognate languages which distinguished the university of Halle in the period of Pietism. He was born in 1717, and died in 1791.

MICHAUD, JOSEPH, French historian and publicist, was born of an old family on June 19, 1767, at Albens, Savoy. In 1791 he went to Paris, where, not without danger, he took part in editing several royalist journals. In 1794 he started *La Quotidienne*. Along with his brother and two colleagues he published in 1806 a *Biographie moderne, ou dictionnaire des hommes qui se sont fait un nom en Europe depuis 1789*, the earliest work of its kind; in 1808 the first volume of his *Histoire des Croisades* appeared, and in 1811 he originated the *Biographie Universelle*. In 1814 he resumed the editorship of the *Quotidienne*, and in the same year was elected Academician. In 1815 his brochure entitled *Histoire des quinze Semaines ou le dernier règne de Bonaparte* met with extraordinary success. In 1830-31 he traveled in Syria and Egypt for the purpose of collecting additional materials for the *Histoire des Croisades*. The *Bibliothèque des Croisades*, in four volumes more, contained the "pièces justificatives" of the *Histoire*. Michaud died on September 30, 1839, at Passy, where his home had been since 1832.

MICHAUX, ANDRÉ, a French botanist, best known for his works on the flora of North America and as a botanical traveler, was born in 1746 and died in 1802.

MICHAUX, FRANÇOIS ANDRÉ, born 1770 and died 1855, son of the preceding, was, like his father, em-

ployed by the French Government to explore the forests of North America with a view to the introduction into France of trees valuable for their wood or other products. He was very successful in carrying out this object.

MICHELANGELO, Michelangelo Buonarroti, best known simply as Michelangelo, the last and most famous of the great artists of Florence, was the son of Ludovico Buonarroti, a poor gentleman of that city, and on March 6, 1475, the second son, Michelagnolo, or Michelangelo, was born. While still a young boy, Michelangelo determined, in spite of his father's opposition, to be an artist. He had sucked in the passion, as he himself used to say, with his foster-mother's milk.

Though Michelangelo's earliest studies were directed toward painting, he was by nature and predilection much more inclined to sculpture. In that art he presently received encouragement and training under the eye of an illustrious patron, Lorenzo dei Medici.

Michelangelo had been attached to the school and household of the Medici for barely three years when, in 1492, his great patron Lorenzo died. Lorenzo's son Piero dei Medici inherited the position, but not the qualities, of his father; Florence soon chafed under his authority; and toward the autumn of 1494 it became apparent that disaster was impending over him and his adherents. Michelangelo was constitutionally subject to dark and sudden presentiments; one such seized him now, and, without awaiting the popular outbreak which soon followed, he took horse with two companions and fled to Bologna. There, being now in his twentieth year, he was received with kindness by a member of the Aldovrandi family, and on his commission executed two figures of saints, and one of an angel, for the shrine of St. Dominic in the church of St. Petronius. After about a year, work at Bologna failing, and his name having been included in his absence on the list of artists appointed to provide a new hall of assembly for the Great Council of Florence, Michelangelo returned home. Michelangelo was not left without employment. He found a friend in another Lorenzo, the son of Pierfrancesco dei Medici, for whom he at this time executed a statue of the boy St. John. He set out for Rome for the first time at the end of June, 1496.

Michelangelo's stay in Rome at this time lasted five years, from the summer of 1496 till that of 1501. Having after an illness, come home in the latter year, Michelangelo received the request from the cardinal Francesco Piccolomini to adorn with a number of sculptured figures a shrine already begun in the cathedral of Siena in honor of the most distinguished member of his house, Pope Pius II. Four only of these figures were ever executed, and those not apparently, or only in small part, by the master's hand. A work of greater interest in Florence itself had diverted him from his engagement to his Sienese patron. This was the execution of the famous colossal statue of David, popularly known as the Giant. It was carved out of a huge block of marble on which another sculptor, Agostino d'Antonio, had begun unsuccessfully to work forty years before, and which had been lying idle ever since. Michelangelo had here a difficult problem before him. Without much regard to tradition or the historical character of his hero, he carved out of the vast but cramped mass of material a youthful, frowning colossus, which amazed every beholder by its freedom and science of execution, and its victorious energy of expression. All the best artists of Florence were called in council to determine on what site it should be set up, and after much debate the terrace of the Palace of the Signory was chosen, in preference to the neighboring Loggia dei Lanzi. Here, accordingly, the colossal David of Michelangelo took, in the month

of May, 1504, the place which it continued to hold ever afterward, until some years ago, in 1873, it was removed for the sake of protection to a hall in the Academy of Fine Arts. Other works of sculpture by the same indomitable hand also belong to this period.

Neither was Michelangelo idle at the same time as a painter. Leaving disputed works out of sight, he, in these days at any rate, painted for his and Raphael's common patron, Angelo Doni, the *Holy Family* now in the Uffizi at Florence. And in the autumn of 1504, the year of the completion of the David, he received from the Florentine state a commission for a work of monumental painting on an heroic scale. Leonardo da Vinci had been for some months engaged on his great cartoon of the battle of Anghiari, to be painted on the wall of the great hall of the municipal council. The gonfaloniere Soderini now procured for Michelangelo the commission to design a companion work. Michelangelo chose an incident of the Pisan war, when the Florentine soldiery had been surprised by the enemy in the act of bathing; he dashed at the task with his accustomed fiery energy, and had carried a great part of the cartoon to completion when, in the early spring of 1505, he broke off the work in order to obey a call to Rome which reached him from Pope Julius II.

Michelangelo had not been long in the Eternal City before his new patron devised fit employment for him. That capacious and headstrong spirit, on fire with great enterprises, had conceived the idea of a sepulchral monument to commemorate his glory when he should be dead, and to be executed according to his own plans while he was still living. He intrusted this congenial task to Michelangelo. The design being approved, the artist spent the winter of 1505-6 at the quarries of Carrara, superintending the excavation and shipment of the necessary marbles. In the spring he returned to Rome, and when the marbles arrived fell to with all his energy at the preparations for the work. For awhile the pope followed their progress eagerly, and was all kindness to the young sculptor. But presently his disposition changed. In Michelangelo's absence an artist who was no friend of his, Bramante of Urbino, had been selected by Julius to carry out a new architectural scheme, commensurate with the usual vastness of his conceptions, namely, the rebuilding of St. Peter's church. To the influence and the malice of Bramante, Michelangelo attributed the unwelcome invitation he now received to interrupt the great work of sculpture which he had just begun, in order to decorate the Sixtine chapel with frescoes. Convinced that not his employment only, but his life, was threatened, he suddenly took horse and left Rome, and before the messengers of the pope could overtake him was safe on Florentine territory. Michelangelo's flight took place in April, 1506. Once among his own people, he turned a deaf ear to all overtures made from Rome for his return, and stayed throughout the summer at Florence.

During the same summer Julius planned and executed the victorious military campaign which ended in his unopposed entry at the head of his army into Bologna. Thither, under strict safe-conduct and promises of renewed favor, Michelangelo was at last prevailed on to betake himself. Julius received the truant artist kindly, as indeed between these two volcanic natures there existed a natural affinity, and ordered of him his own colossal likeness in bronze, to be set up, as a symbol of his conquering authority, over the principal entrance of the church of St. Petronius. Three years later it was destroyed in a revolution. The people of Bologna rose against the authority of Julius; his delegates and partisans were cast out, and his effigy hurled from its place. The work of Michelangelo, after being trailed in

derision through the streets, was broken up and its fragments cast into the furnace.

Meanwhile the artist himself, as soon as his work was done, had followed his reconciled master back to Rome. The task that here awaited him, however, was after all not the resumption of the papal monument, but the execution of the series of paintings in the Sistine chapel which had been mooted before his departure. Michelangelo's plan was accepted by the pope, and by May, 1508, his preparations for its execution were made. The physical conditions of prolonged work, face upward, upon this vast expanse of ceiling, were adverse and trying in the extreme. But after four and a half years of toil the task was accomplished. Once during the progress of his task Michelangelo was compelled to remove a portion of the scaffolding and exhibit what had been so far done, when the effect alike upon friends and detractors was overwhelming. Still more complete was his triumph when, late in the autumn of 1512, the whole of his vast achievement was disclosed to view.

The Sistine chapel was no sooner completed than Michelangelo resumed work upon the marbles for the monument of Julius. But four months only had passed when Julius died. His heirs immediately entered (in the summer of 1513) into a new contract with Michelangelo for the execution of the monument on a reduced scale. The entire work was to be completed in nine years' time. During the next three years, it would seem, Michelangelo brought to completion three at least of the promised figures, and they are among the most famous of all existing works of the sculptor's art—namely, the Moses now in the church of S. Pietro in Vincoli at Rome and the two "Slaves" at the Louvre.

Julius II. had been succeeded on the papal throne by a Medici under the title of Leo X. Leo X. and his kinsmen insisted that Michelangelo, regardless of all other engagements, must design and carry out a great new scheme for the enrichment of their own family church of San Lorenzo in Florence. Unwillingly Michelangelo accepted the new commission thus thrust upon him for the church façade at Florence; but, having once accepted it, he produced a design of combined sculpture and architecture as splendid and ambitious in its way as had been that for the monument of Julius. In the summer of 1516 he left Rome for Carrara to superintend the excavation of the marbles.

When all was well in progress there under his own eye, reasons of state induced the Medici and the Florentine magistracy to bid him resort instead to certain new quarries at Pietrasanta, near Serravalle, in the territory of Florence. Presently he found himself so impeded and enraged by the mechanical difficulties of raising and transporting the marbles, and by the disloyalty and incompetence of those with whom he had to deal, that he was fain to throw up the commission altogether. The contracts for the façade of San Lorenzo were rescinded in March, 1518, and the whole magnificent scheme came to nothing. Michelangelo then returned to Florence, where proposals of work poured in on him from many quarters. He complied with none of these requests.

The next twelve years of Michelangelo's life (1522-34) were spent at Florence, and again employed principally in the service of his capricious and uncongenial patrons, the Medici. The plan of a great group of monuments to deceased members of this family, to be set up in their mortuary chapel in San Lorenzo, seems to have been formed, and preparations to have been made by Michelangelo for its execution, as early as 1519. It was not, however, until 1524, after Leo X. had died, and his successor, Adrian VI., had been in his turn succeeded by another Medicean pope, Clem-

ent VII., that any practical impulse was given to the work. In 1527 came to pass the sack of Rome by the Austrians, and the apparent irretrievable ruin of Pope Clement. The Florentines seized the occasion to expel the Medici from their city, and set up a free republican government once more. Soon Michelangelo was called to help in defending the city itself from danger. In view of an approaching siege, he was appointed engineer-in-chief of the fortifications. He spent the early summer of 1529 in strengthening the defenses of San Miniato; from July to September he was absent on a diplomatic mission to Ferrara and Venice. Returning in the middle of the latter month, he found the cause of Florence hopeless from internal treachery and from the overwhelming strength of her enemies. One of his dark seizures overcame him, and he departed again suddenly for Venice. Not cowardice, but despair of his city's liberties, and still more of his own professional prospects amid the turmoil of Italian affairs, was the motive of his departure. For awhile he remained in Venice, negotiating for a future residence in France. Then, while the siege was still in progress, he returned once more to Florence; but in the final death-struggle of her liberties he bore no part. When, in 1530, the city submitted to her conquerors, no mercy was shown to most of those who had taken part in her defense. Michelangelo believed himself in danger with the rest, but on the intervention of Baccio Valori he was presently taken back into favor and employment by Pope Clement. For three years more he still remained at Florence, engaged principally on the completion of the Medici monuments, and on the continuance of the Medicean library, but partly also on a picture of Leda for the duke of Ferrara.

Clement insisted that Michelangelo must complete his decorations of the Sistine chapel by painting anew the great end wall above the altar, adorned until then by frescoes of Perugino. The subject chosen was the *Last Judgment*, and Michelangelo began to prepare sketches. For the next two years he lived between Rome and Florence, and in the autumn of 1534, in his sixtieth year, settled finally and for the remainder of his life at Rome. Immediately afterward Pope Clement died, and was succeeded by a Farnese under the title of Paul III. Even more than his predecessor, Paul insisted on claiming the main services of Michelangelo for himself, and forced him to let all other engagements drift. For the first seven years after the artist's return to Rome, his time was principally taken up with the painting of the colossal and multitudinous *Last Judgment*. This being completed in 1541, he was next compelled to undertake two more great frescoes, one of the Conversion of Paul and another of the Martyrdom of Peter, in a new chapel which the pope had caused to be built in the Vatican, and named after himself *Capella Paolina*.

During the fifteen years (1534-49) when Michelangelo was mainly engaged on these paintings, he had also at last been enabled to acquit himself, although in a manner that can have been satisfactory to none concerned, of his engagements to the heirs of Julius. It was agreed that the Moses executed thirty years ago should be the central figure of the new scheme; assistants were employed to carve two smaller flanking figures of female personifications; and the three were in 1545 set up in S. Pietro in Vincoli in combination with an architectural structure of rich but incongruous design. During the same years the long-pent human elements of fervor and tenderness in Michelangelo's nature had found vent and utterance such as they had never found before. He had occasionally practiced poetry in his youth, and there are signs of some transient love-passage during his

life at Bologna. But it was not until toward his sixtieth year that the springs of feeling were fairly opened in the heart of this solitary, this masterful and stern, life-wearied and labor-hardened man. Toward that age we find him beginning to address impassioned sonnets, of which the sentiment is curiously comparable to that expressed in some of Shakespeare's, to a beautiful and gifted youth, Tommaso Cavalieri. Soon afterward he made the acquaintance of the pious, accomplished, and high-souled lady, Vittoria Colonna, widow of the Marquis Pescara. For twelve years, until her death, which happened in 1547, her friendship was the great solace of Michelangelo's life. On her, in all loyalty and reverence, he poured out all the treasures of his mind, and all his imprisoned powers of tenderness and devotion. He painted for her a crucifixion of extraordinary beauty, of which many imitations but not the original have come down to us. She was the chief inspirer of his poetry—in which, along with her praises, the main themes are the Christian religion, the joys of Platonic love, and the power and mysteries of art. Michelangelo's poetical style is strenuous and concentrated like the man. He wrote with labor and much self-correction; we seem to feel him flinging himself on the material of language with the same overwhelming energy and vehemence—the same impetuosity of temperament, combined with the same fierce desire of perfection—with which contemporaries describe him as flinging himself on the material of marble.

And so the mighty sculptor, painter, and poet reached old age. An infirmity which settled on him in 1544, and the death of Vittoria Colonna in 1547, left him broken in health and heart. But his strength held on for many a year longer yet. During the last years of his life he made but few more essays in sculpture, and those not successful, but was much employed in the fourth art, in which he excelled, that of architecture. A succession of popes demanded his services for the embellishment of Rome. For Paul III. he built the palace called, after the name of the pope's family, the Farnese. On the death of Antonio da San Gallo he succeeded to the onerous and coveted office of chief architect of St. Peter's Church, for which he remodeled all the designs, living to see some of the main features, including the supports and lower portion of the great central dome, carried out, in spite of all obstacles, according to his plans. Other great architectural tasks on which he was engaged were the conversion of a portion of the Baths of Diocletian into the church of Sta Maria degli Angeli, and the embellishment and rearrangement of the great group of buildings on the Roman Capitol. At length, in the midst of these vast schemes and responsibilities, the heroic old man's last remains of strength gave way. He died on the threshold of his ninetieth year, on February 18, 1564.

MICHELET, JULES, one of the most voluminous and remarkable writers of France, and one who only lacked a keener power of self-criticism to make him one of the greatest, was born at Paris, August 21, 1798. Between 1825 and 1827 he produced divers sketches, chronological tables, etc., of modern history. Four years later, in 1831, the *Introduction à l'Histoire Universelle* showed a very different style. Very soon afterward he began his chief and monumental work, the *Histoire de France*, which occupied him for about forty years. But he accompanied this with numerous other works, chiefly of erudition, such as the *Œuvres Choies de Vico*, the *Mémoires de Luther écrits par lui-même*, the *Origines du Droit Français*, and somewhat later the *Procès des Templiers*. He published, in 1839, a *History of the Roman Republic*, but this was in his graver and earlier manner. The results of his lectures

appeared in the volumes *Le Prêtre, la Femme, et la Famille* and *Le Peuple*.

Besides continuing the great history, he undertook and carried out, during the years between the downfall of Louis Philippe and the final establishment of Napoleon III., an enthusiastic *Histoire de la Révolution Française*. While the history steadily held its way, a crowd of extraordinary little books accompanied and diversified it. The first of these (by no means the best) was *Les Femmes de la Révolution* (1854). In the next, *L'Oiseau* (1856), a new and most successful vein was struck. *L'Insecte*, in the same key, but duller, followed. It was succeeded by *L'Amour* (1859). *L'Amour* was followed by *La Femme* (1860). Then came *La Mer* (1861). The next year (1862) the most striking of all Michelet's minor works, *La Sorcière*, made its appearance. The ambitious *Bible de l'Humanité* (1864), an historical sketch of religion, has but little merit. In *La Montagne* (1868), *Nos Fils* (1869), *Le Banquet*, *Les Soldats de la Révolution*, and *Légendes Démocratiques du Nord* we have a remarkable exhibit.

Uncompromisingly hostile as Michelet was to the empire, its downfall and the accompanying disasters of the country once more stimulated him to activity. Not only did he write letters and pamphlets during the struggle, but when it was over he set himself to complete the vast task which his two great histories had almost covered by a *History of the Nineteenth Century*. He did not, however, live to carry it further than Waterloo. He died at Hyères on February 9, 1874, and an unseemly legal strife between his representatives took place at his funeral.

MICHELL, JOHN, an eminent English man of science of the eighteenth century. The date of his birth is unknown. He died in 1793.

MICHELOZZI, MICHELOZZO, born 1391, died 1472, was a Florentine by birth, the son of a tailor, and in early life a pupil of Donatello. He was a sculptor of some ability in marble, bronze, and silver. Though skilled both as a sculptor and as an engineer, his fame chiefly rests on his architectural works, which claim for him a position of very high honor even among the greatest names of the great fifteenth century Florentines.

MICHIGAN, one of the States of the American Union, situated in the region of the great lakes, the center of the State being 670 miles north of west from New York, the nearest point on the seaboard. The area is 58,915 square miles. The State consists of two natural divisions, known as the Upper and Lower Peninsulas. The Upper or Northern Peninsula is bounded on the north, east, and south by Lakes Superior, Huron and Michigan, and on the west by the river St. Mary and the State of Wisconsin. The Lower Peninsula is bounded on the west, north and east by Lakes Michigan, Huron, St. Clair and Erie, and the St. Clair and Detroit rivers, and on the south by the States of Ohio and Indiana. The general contour of the Lower Peninsula approaches that of a horseshoe, with an average width of about 200 miles from east to west, and a length of about 300 miles from north to south. Its surface gradually rises in gentle undulations from the surrounding lakes to an elevation of about 400 feet above Lake Huron, no point reaching an altitude of more than 600 feet. The Upper Peninsula is much more rugged in contour and surface, at some points reaching an elevation of about 1,100 feet. The territory was originally covered with forests, with only here and there a small open prairie. It abounds in fine inland lakes, with areas varying from a few acres to several miles. The rivers are not large enough to be navigable, but they afford ample water-power, and are particularly valuable for floating down the logs of the lumbering districts. The coast-line of



the State is not less than about 1,600 miles in length; and along the whole of this distance vessels of 2,000 tons may pass without losing sight of land.

The mean temperature of Lansing, the capital of the State, as determined by observations extending through eighteen years, is 46.71° Fahr., or about the same as that of Berlin. During the summer months the mean temperature is nearly the same as that of Vienna; in the winter it is nearly that of Stockholm. The annual rainfall during eighteen years was about thirty-one inches. This is very evenly distributed throughout the year, though a little more than half the amount falls in the five months from May to October. The average snowfall in the center of the State is about four feet, though it is seldom that more than twelve inches lie on the ground at any one time. The winter temperature is much modified by the open water of the adjacent lakes. The severe winds are commonly from the west and northwest; but in sweeping across the open waters of Lake Michigan they are so far softened as to make the climate much milder than that found in the same latitude on the western side of the lake. This peculiarity is specially favorable to the growth of fruits. Peaches are grown successfully along the forty-fifth parallel, and figs thrive in the open air in latitude $42\frac{1}{2}^{\circ}$. The modifying influence of the lake winds also gives great variety to the flora. The predominant woods are oak, maple, beech, elm, ash, cherry, hickory, walnut, basswood, and pine. All these grow luxuriantly in the vast forests of the State, and afford an abundant supply of the best timber. There are 165 species of trees and shrubs indigenous to Michigan; and the entire flora of the State makes a list of 1,634 species.

The most important crop of Michigan is wheat, and the average yield per acre, as shown by the census of 1880, was greater than that of any other State in the Union. Michigan was fourth in rank of the wheat-producing States, the number of bushels grown being exceeded by the crops of Illinois, Ohio, and Indiana. This position has changed, she now occupying the ninth place. Of the fruits grown in the State apples are the most important, and these are believed to be unsurpassed in excellence in any country in the world. The sales in 1888 were 1,406,729 bushels, a considerable quantity going to the markets of Europe. Next in importance is the peach crop, annually gathered from more than fifty of the counties of the State. In 1888 the peach orchards were reported as covering 14,908 acres, and the fruit sold as amounting to 236,053 bushels. The long coast-line of Lake Michigan affords easy access to market even for the most perishable fruits. Besides the facilities thus afforded, the railroads that now thread the State, with an aggregate length in 1889 of 4,586 miles, afford abundant means of rapid transportation. As the fruit belt extends from north to south more than 200 miles, the danger of disastrous competition in the markets is obviated by prolongation of the season of ripening. At a meeting of the State Horticultural Society it was reported that the average annual value of the peach crop per acre was above \$125. The nineteen volumes of the *Transactions* of the State Horticultural Society, published since its organization in 1870, show that the development of fruit culture within the last decade has been much more rapid than in any other State.

The timber produce in Michigan is of superior quality, and the amount is so great that about two-thirds of the best lumber sold in Chicago, New York, Philadelphia, and Boston go out from its mills. The logs are borne along the lakes, rivers, and small watercourses to the booms of mills situated at convenient points, where the lumber is sawed and shipped for the different mar-

kets of the world. Of these manufacturing districts those known as the Saginaw, the Grand River, and the Muskegon valleys are the most important. The Saginaw receives the waters of the Tittabawassee, the Cass, the Flint, the Shiawassee, the Bad, the Pine, the Chippewa, the Tobacco, and their numerous tributaries, draining a vast region that still yields an undiminished supply of pine. The forests of the western parts of the State are easily accessible by the Grand River and its tributaries, while those still farther north find a natural outlet through the numerous streams that flow into Lake Michigan. On the banks of these watercourses are some of the largest and finest mills of the world. In 1854, when the first effort was made to collect statistics of this industry, it was found that there were only sixty-one mills in operation, and that the entire annual product was only 108,000,000 feet. Eighteen years later, in 1872, it was estimated that the annual product was not less than 2,560,000 feet of oaks, 12,700,000 staves, 300,000,000 lath, 400,000,000 shingles, and 2,500,000,000 of sawed pine. The number of sawmills had already reached about 1,500, the number of persons employed 20,000, and the capital represented \$25,000,000. In 1881 the manufacture of pine lumber amounted to 3,919,500,000 feet, the value of which exceeded \$60,000,000. The aggregate value of the forest products of the State was estimated in 1881 to have reached more than \$1,000,000,000. These figures have slightly decreased since that date.

Lumbering is the second great industrial interest of the state. The forests of northern Michigan are mostly pine, much of it as the cork-pine of superior quality and greatly in demand; and for many years the lumber product has been enormous. In 1888 it was: lumber, 4,197,741,224 feet; shingles, 2,560,930,250. In places, however, this industry is beginning to decline, from the extensive destruction of the forests. Other leading manufactories, in order, are grist-mills, foundries and machine shops, iron and steel works, and those of agricultural implements and of furniture. But agriculture remains the chief industry, employing about half the population. This is one of the greatest wheat states, its average yield per acre $19\frac{1}{2}$ bushels. The next most important crops are maize, oats, and barley; and in the "fruit belt," a narrow strip of about 200 miles in length on the west shore of Lake Michigan, peaches, plums, grapes, and other fruits are grown in great quantity. It is the fourth state in the Union for wool, of which 11,898,047 pounds were marketed in 1888.

Of the mineral products of Michigan the most important is iron. As early as 1842 the report of the first state geologist, Dr. Douglas Houghton, called attention to the presence of hematite ore, though for a considerable time after this it was not found in such quantities as to make it certain that mining could be made profitable. Before 1860, however, it became known that iron in the Upper Peninsula not only existed in vast quantities, but also that it was of superior quality. Michigan minerals are of extraordinary richness—62.6 per cent. being the average of the first-class ores, while the furnace books often show a much higher yield. In salt and timber Michigan leads the United States, and in iron and copper the world. The great Calumet and Hecla copper-mines, the largest operated, with perhaps one exception, are on the Keweenaw Peninsula. The total copper output of 1889 was 43,613 tons, of a quality nowhere surpassed, and for certain purposes unequaled. In the same year 5,829,828 long tons of iron ore were mined, mainly in Marquette county. Some gold is found in the upper peninsula, and silver and lead in small amounts. Gypsum appears in immense deposits at Grand Rapids in the lower peninsula, where 19,823 tons of landplaster and 206,380 barrels of stucco were

produced in 1889. Building-stones abound in both peninsulas, and in the upper there are also statuary and other marbles, and such ornamental stones as agates, jasper, chalcedony, chlorastolites, and others. Glass-sand is found in the extreme southeast of the state; lime, brick, tiles, etc., are made easily and cheaply. Of the many mineral springs nineteen have become popular resorts; and the waters of four have a commercial value.

Within a few years the salt-works of Michigan have also come to exceed those of any other State in the Union. The salt-producing rock covers no less than about 8,000 square miles, and it is safe to presume that the supply is inexhaustible. The average depth of the wells is about 800 feet, but in some localities wells sunk to nearly 2,000 feet have been remunerative. The inspection of salt during the year ending November 30, 1890, was 3,838,637 barrels.

There are also certain other minerals of considerable importance. Deposits of gypsum, easily accessible, practically inexhaustible in quantity, and superior in quality, are found in several localities both in the eastern and in the western parts of the Lower Peninsula. In the outskirts of Grand Rapids the deposit crops out at the surface, and at an average depth of from forty to seventy feet extends over an area of ten or twelve square miles. The rock is easily quarried, and is either ground for use as a fertilizer or calcined into plaster of Paris. The deposits of coal are supposed to cover about 8,000 square miles, but as yet the product at any one point has not been very considerable. In quality the coal is highly bituminous, and is not sufficiently pure to be useful for smelting or for the manufacture of gas. For these reasons the stock of coal in the State is practically untouched. If future explorations and experiments should make these deposits available, a new era in the manufacture of iron will be the result. At present the coal for smelting the Lake Superior ores is brought chiefly from Ohio and Pennsylvania. Quarries of limestone and of sandstone have been opened in various parts of the State. The brown stone of the Upper Peninsula is of excellent quality, and is capable of receiving a high finish. The supply is inexhaustible, and the accessibility of the quarries by water gives promise of a thriving industry. The grindstones taken from the Huron county quarries are of superior quality, and the slates found in unlimited quantities on the shores of the Huron Bay are unsurpassed in point of durability and color. Clays and sands of commercial value are found in great abundance. Though the manufacture of glass is yet in its infancy, sand in large quantities has been discovered in Monroe county suitable for the manufacture of plate glass of excellent quality. Brick and tile clays are found in all parts of the State. Though native silver has been found in small quantities in the Upper Peninsula, the systematic mining of this metal has not yet been carried on with successful results.

The geographical position of Michigan explains the fact that its fresh-water fisheries are the most productive in the United States. The most important varieties of fish are lake-trout, sturgeon, bass, pickerel, herring, brook-trout, grayling, and whitefish. General laws for the protection of fish have been passed; and a fish commission has been maintained for some years for the purpose of propagating the best varieties and planting them in waters adapted to their natural development.

As early as 1785 the law of Congress which provided for the sale of lands north of the Ohio river reserved for the support of public schools "section 16" of each township. This fundamental law devoted to educational purposes one-thirty-sixth of all the lands of that vast domain known as the Northwest Territory. The "ordinance of 1787," by which this territory was organized,

further provided that "schools and the means of education shall forever be encouraged." In 1826 this congressional action was supplemented by a grant to Michigan of two townships of land for the founding and support of a university. When Michigan became a State, in 1837, its educational policy took a definite form. The constitution provided, not only that the grant of "section 16" should be devoted exclusively to the support of schools of the primary grade, but also that the State, and not each township, should be the custodian of the lands so appropriated. The constitution expressly provided that the proceeds from the sale of "school lands" should be held by the State as a perpetual fund, the interest of which should be annually applied to the support of primary schools. The lands devoted to school purposes in Michigan under these provisions amounted to 1,077,209 acres. On the sum realized by sales, the State pays interest at 7 per cent., and the resulting income is annually distributed to the schools. This source is supplemented from local taxes.

The schools organized under State law are known as graded and ungraded. In the small districts where the schools are under the charge of but one or two teachers, grading is impracticable. The school census includes all children between the ages of five and twenty. In the graded schools the division is into primary schools, grammar schools, and high schools, each of these divisions retaining the scholar ordinarily four years. At the end of the course the student is ready for the university, to which, under certain restrictions provided by the university itself, he is admitted on diploma from the high school. The University of Michigan, situated at Ann Arbor, was first opened for instruction in 1841. It now (1889) consists of the department of literature, science, and the arts, the department of medicine, the department of law, the college of homœopathic medicine, the school of pharmacy, the college of dental surgery, and the school of political science. Connected with the medical department are the State hospitals.

Latest official statistics show that Michigan has practically no State debt, there being only a few thousand dollars outstanding and that having ceased to bear interest. The county debts amount to about \$1,600,000. The receipts of the State treasury for 1889 were \$3,062,551 and the disbursements \$3,134,929, but there was a large balance from the previous year, and on June 30 there was \$1,116,189 in the treasury.

At the end of the school year there were 7,145 school districts, with a school population of 640,069, of whom 423,604 were enrolled in the public schools. The value of school property was \$13,286,667, and the total school revenue was \$6,368,734.

The railroad system of the State is extensive, the track mileage in 1890 being returned at 6,670 miles. The total revenue for the year 1890 was \$96,423,071, the operating expenses \$64,613,791, and the amount paid in dividends \$8,096,184.

In 1837 the state had 174,647 inhabitants. The numbers, according to the different census returns from 1840, are given in the following table:

Census.	Total.	Males.	Females.	Density per Square Mile.
1840	212,267	113,788	98,479	3.77
1850	397,654	209,897	187,757	7.07
1860	749,113	394,694	354,419	12.11
1870	1,184,059	617,745	566,314	20.01
1880	1,636,937	862,678	774,259	27.80

In 1890 the population was 2,093,889, being a gain of 465,852, or 28.48 per cent. over that of 1880.

At the 1880 census 388,508 of the inhabitants were of foreign birth, 97,346 being natives of the United Kingdom, 89,085 Germans, and 16,445 Scandinavians.

The following are the principal cities in the State:—Detroit, Grand Rapids, Bay City, East Saginaw, Jackson, Muskegon, Saginaw, Port Huron, Flint, Lansing (the state capital), Ann Arbor, Adrian, Battle Creek, Manistee, West Bay, Alpena, Ishpeming.

The State of Michigan is part of the territory that was first settled by the French, and until the fall of Canada into the hands of the British after the middle of the eighteenth century was under the government of New France. The territory was explored by Jesuit missionaries in the seventeenth century; but, although it was known at an early period that the lands were of exceptional excellence, very little progress was made in developing the resources of the Territory until after the completion of the first half century of the American Union. The surveyors employed by the general government to inspect the lands and report as to their fitness for settlement by the soldiers of the war of 1812 appear to have derived their impressions almost exclusively from the low lands in the southeastern corner of the Territory. The report, accordingly, was not favorable; and consequently the tide of immigration that had already begun to set in flowed steadily past Michigan into the Territories farther west. It was largely for this reason that the early development of Indiana, Illinois, Iowa, and Wisconsin was somewhat more rapid than that of Michigan. But gradually the false impressions concerning the soil and climate were dispelled; and within the past few years the increase of the population and the growth of wealth have been very rapid.

MICHIGAN, LAKE. See **ST. LAWRENCE**.

MICHIGAN CITY, a town of the United States, in Laporte county, Ind., on the southeast shore of Lake Michigan, forty miles east-southeast of Chicago. As a lake port and a junction for several railroads, it is a place of considerable prosperity. It is the largest lumber market in the State, and one of the largest in the west, and has numerous manufacturing establishments. The northern State prison (with 577 convicts at the close of 1880) is one of the principal buildings. The population increased from 3,985 in 1870 to 10,776 in 1890.

MICHMASH, the scene of one of the most striking episodes in Old Testament history, was a place in Benjamin, about nine Roman miles north of Jerusalem. Though it did not rank as a city, Michmash was recolonized after the exile, and, favored by the possession of excellent wheat-land, was still a very large village in the time of Eusebius. The modern Makhmás is quite a small place.

MICKIEWICZ, ADAM, Polish poet, was born in 1798, near Nowogrodek, in the present government of Minsk, and died in 1855.

MICKLE, WILLIAM JULIUS, son of the minister of Langholm, Dumfriesshire, Scotland, holds a respectable place among the imitative minor poets of the eighteenth century. He was born in 1734 and died in 1788.

MICROMETER, an instrument generally applied to telescopes and microscopes for measuring small angular distances with the former or the dimensions of small objects with the latter.

Before the invention of the telescope the accuracy of astronomical observations was necessarily limited by the angle that could be distinguished by the naked eye. The angle between two objects, such as stars or the opposite limbs of the sun, was measured by directing an arm furnished with fine "sights" (in the sense of the "sights" of a rifle) first upon one of the objects and then upon the other, or by employing an instrument

having two arms each furnished with a pair of sights, and directing one pair of sights upon one object and the second pair upon the other. The angle through which the arm was moved, or, in the latter case, the angle between the two arms, was read off upon a finely graduated arc. With such means no very high accuracy was possible.

The invention of the telescope at once extended the possibilities of accuracy in astronomical measurements. The planets were shown to have visible disks, and to be attended by satellites whose distance and position angle relative to the planet it was desirable to measure. It became, in fact, essential to invent a "micrometer" for measuring the small angles which were thus for the first time rendered sensible. There is now no doubt that William Gascoigne, a young gentleman of Yorkshire, was the first inventor of the micrometer.

The principle of Gascoigne's micrometer is that two pointers, having parallel edges at right angles to the measuring screw, are moved in opposite directions symmetrically with and at right angles to the axis of the telescope. The micrometer is at zero when the two edges are brought exactly together. The edges are then separated till they are tangent to the opposite limbs of the disk of the planet to be measured, or till they respectively bisect two stars, the angle between which is to be determined. The symmetrical separation of the edges is produced and measured by a single screw; the fractions of a revolution of the screw are obtained by an index attached to one end of the screw, reading on a dial divided into 100 equal parts. The whole arrangement is elegant and ingenious.

As the powers of the telescope were gradually developed, it was found that the finest hairs or filaments of silk, or the thinnest silver wires that could be drawn, were much too thick for the refined purposes of the astronomer, as they entirely obliterated the image of a star in the more powerful telescopes. To obviate this difficulty Prof. Felice Fontana, of Florence, first proposed the use of spider webs in micrometers, but it was not till the attention of Troughton had been directed to the subject by Rittenhouse that the idea was carried into practice.

MICRONESIA. The term "Micronesia" embraces that region of the Pacific north of the great Melanesian islands, where, either perhaps from a greater or more rapid subsidence, or from the decreasing activity northward of the coral builders, the islands become, generally speaking, smaller and fewer, and finally cease. Accordingly, excepting the Marianas or Ladrões, which are of volcanic origin, and a few isolated instances of elevation in the Carolines, the Micronesian islands, though many of the groups cover a vast area, are almost without exception very small low coral (atoll) formations. Besides the **LADRONE** and **CAROLINE ISLANDS** (*q.v.*) Micronesia includes the Marshall and Gilbert groups, and some geographers include the Anson group, a number of small, widely-scattered islets to the west of Hawaii, the Magellan group farther west, and the Bonin Islands north of the Ladrões.

Northeasterly winds prevail during the winter months over the Marshalls, Ladrões, and Carolines, except in the extreme west, while between May and September the influence of the monsoon causes unsettled weather from the west, with heavy gales. In the Gilberts the southeast trade-wind brings fine weather at this season.

MICROPHONE. See **TELEPHONE**.

MICROSCOPE. The microscope is an optical instrument for the examination of minute objects or parts of objects, which enlarges the visual pictures formed upon the retina of the observer by the rays proceeding from them.

Microscopes are distinguished as *simple* or *compound*. In the former, the rays which enter the eye of the observer come from an object brought near to it after refraction through either a single lens or a combination of lenses acting as a single lens—its action as a “magnifier” depending on its enabling the eye to form a distinct image of the object at a much shorter distance than would otherwise be possible. The latter consists of at least two lenses, so placed relatively to the object, to the eye, and to one another that an enlarged image of the object, formed by the lens placed nearest to it (the “object-glass”), is looked at through the lens nearest the eye (the “eye-glass”), which acts as a simple microscope in “magnifying” it; so that the compound microscope may be described as a simple microscope used to look at an enlarged image of the object, instead of at the object itself.

Simple Microscope.—Any solid or liquid transparent medium of lenticular form, having either one convex and one flat surface or two convex surfaces whose axes are coincident, may serve as a “magnifier”—what is essential being that it shall have the power of so refracting the rays which pass through it as to cause widely diverging rays to become either parallel or but slightly divergent. Thus if a minute object be placed on a slip of glass, and a single drop of water be carefully placed upon it, the drop will act as a magnifier in virtue of the convexity of its upper surface; so that when the eye is brought sufficiently near it (the glass being, of course, held horizontally, so as not to distort the spherical curvature of the drop) the object will be seen much enlarged. And if a small hole be made in a thin plate of metal, and a minute drop of water be inserted in it, this drop, having two convex surfaces, will serve as a still more powerful magnifier. There is reason to believe that the magnifying power of transparent media with convex surfaces was very early known. A convex lens of rock-crystal was found by Layard among the ruins of the palace of Nimrud. And it is pretty certain that, after the invention of glass, hollow spheres blown of that material and filled with water were commonly used as magnifiers. The perfection of gem-cutting shown in ancient gems, especially in those of very minute size, could not have been attained without the use of such aids to the visual power; and there can be little doubt that the artificers who could execute these wonderful works could also shape and polish the magnifiers best suited for their own or others' use. Though it is impossible to say when convex lenses of glass were first made by grinding, it is quite certain that they were first generally used to assist ordinary vision as “spectacles,” the use of which can be traced back nearly six centuries; and not only were spectacle-makers the first to produce glass magnifiers (or simple microscopes), but by them also the telescope and the compound microscope were first invented. There seems no reason to believe, however, that lenses of very high magnifying power (or short focus) were produced until a demand for them had been created by the introduction of the compound microscope, in which such lenses are required as “object-glasses;” and the difficulty of working lenses of high curvature with the requisite accuracy led in the first instance to the employment of globules made by fusing the ends of threads of spun glass.

Compound Microscope.—The placing of two convex lenses in such relative positions that one should magnify an enlarged image of a small near object formed by the other naturally soon followed the invention of the telescope, and seems to have first occurred to Hans Zansz or his son Zacharias Zansz, spectacle-makers at Middelburg, in Holland, about 1590. One of their

compound microscopes, which they presented to Prince Maurice, was in the year 1617 in the possession of Cornelius Drebell of Alkmaar, who then resided in London as mathematician to King James I.

It has been only within the last seventy years (1820-30) that the microscope has undergone the important improvement which had been worked out by Dollond in the refracting telescope more than sixty years previously—namely, the correction of the chromatic aberration of its objectives by the combination of concave lenses of flint-glass with convex lenses of crown, while their spherical aberration is corrected by the combination (as in Herschel's aplanatic doublet) of convex and concave surfaces of different curvatures. The minute size and high curvature of the lenses required as microscopic objectives were long considered as altogether precluding the possibility of success in the production of such combinations.

It seems to have been by Professor Amici, then of Modena, about 1812, that the first attempts were made at the achromatization of microscopic objectives; but, these attempts not proving successful, he turned his attention to the production of a reflecting microscope, which was a decided improvement upon the non-achromatized compound microscopes then in use. In the year 1820, however, the subject was taken up by Selligues and Chevalier of Paris, who adopted the plan of superposing three or four combinations, each consisting of a double-convex of crown cemented to a plano-concave of flint. The back combination (that nearest to the eye) was of somewhat lower power than those placed in front of it, but these last were all of the same focus, and no attempt was made by these opticians to vary the construction of the several pairs thus united, so as to make them correct each other's aberrations. Hence, although a considerable magnifying power could be thus obtained, with an almost complete extinction of chromatic aberration, the aperture of these objectives could not be greatly widened without the impairment of the distinctness of the image by a “coma” proceeding from uncorrected spherical aberration.

In ignorance, it would appear, of what was being done by the Paris optician, and at the instigation of Doctor Goring (a scientific amateur), Mr. Tulley—well known in London as an able constructor of telescopic objectives—began, about the year 1824, to work object-glasses for the microscope on the telescopic plan. After many trials he succeeded, in 1825, in producing a triplet of $\frac{3}{10}$ inch focus, admitting a pencil of 18° , which was so well corrected as to perform very satisfactorily with an eyepiece giving a magnifying power of 120 diameters. He afterward made a similar triplet of shorter focus, which, when placed in front of the previous one, increased the angle of the transmitted pencil to 38° , and bore an eyepiece giving a magnifying power of 300 diameters. These triplets are said by Mr. Ross to have never been exceeded by any similar combinations for accurate correction throughout the field.

Having come into possession, at the end of 1826, of an objective of Chevalier's construction, Mr. J. J. Lister carefully examined its properties, and compared them with those of Tulley's triplets; and this comparison having led him to institute further experiments, he obtained results which were at first so conflicting that they must have proved utterly bewildering to a less acute mind, but which finally led him to the enunciation of the principle on which all the best microscopic objectives are now constructed. For he discovered that the performance of such composite objectives greatly depends upon the relative position of their component combinations—the effect of the flint plano-concave upon the spherical aberration produced by the double-convex

of crown varying remarkably according to the distance of the luminous point from the front of the objective. If the radiant is at a considerable distance, the rays proceeding from it have their spherical error under-corrected; but, as the source of light is brought nearer to the glass, the flint lens produces greater proportionate effect, and the under-correction diminishes, until at length a point is reached where it disappears entirely, the rays being all brought to one point at the conjugate focus of the lens. This, then, is one aplanatic focus. If, however, the luminous point is brought still nearer to the glass, the influence of the flint continues for a time to increase, and the opposite condition of over-correction shows itself. But, on still further approximation of the radiant, the flint comes to operate with less effect, the excess of correction diminishes and at a point still nearer to the glass vanishes, and a second aplanatic focus appears. From this point onward under-correction takes the place of over-correction, and increases till the object touches the surface of the glass. As every such doublet, therefore, has two aplanatic foci for all points between which it is over-corrected, while for all points beyond it is under-corrected, the optician is enabled to combine two or more doublets with perfect security against spherical error. This will be entirely avoided if the rays be received by the front glass from its shorter aplanatic focus, and transmitted through the the back glass in the direction of its longer aplanatic pencil. By the approximation of the two doublets over-correction will be reduced, while their separation will produce under-correction; and thus, by merely varying the distance between two such combinations, the correction of the spherical error may be either increased or diminished according to a definite rule.

Immersion System.—It was long since pointed out by Professor Amici that the introduction of a drop of water between the front surface of the objective and either the object itself or its covering-glass would diminish the loss of light resulting from the passage of the rays from the object or its covering-glass into air, and from air into the front glass of the objective. It was obvious to him, moreover, that when the rays enter the object-glass from water, instead of from air, both its refractive and its dispersive action will be so greatly changed as to need an important constructive modification to meet the new condition. This modification seems never to have been successfully effected by Amici himself; but his idea was taken up by the two eminent Paris opticians, MM. Hartnack and Nachet, who showed that the application of what is now known as the "immersion system" to objectives of short focus and large angular aperture is attended, not merely with the advantages expected by Professor Amici, but with others on which he did not reckon. As the loss of light by the reflection of a portion of the incident rays increases with the obliquity of their incidence, and as the proportional loss is far smaller when the oblique rays pass into glass from water than when they enter it from air, the advantage of increasing the angular aperture is more fully experienced with "immersion" than with "dry" objectives—just as Professor Amici anticipated. But, further, the immersion system allows of a greater working distance between the objective and the object than can be obtained with a dry or air objective having the same angular aperture; and this increase affords not only a greater freedom of manipulation, but also a greater range of "penetration" or "focal" depth. Further, the observer is rendered so much less dependent upon the exactness of his cover-correction that it is found that water-immersion objectives of high power and considerable angular aperture, extremely well adapted for the ordinary purposes of

scientific investigation, can be constructed without it—a small departure from the standard thickness of covering-glass to which such objectives are adjusted by the maker having scarcely any effect upon the distinctness of the image. It is now the practice of several makers to supply two fronts to objectives of $\frac{1}{10}$ or $\frac{1}{12}$ inch focus, one of them fitting the objective for use "dry" (that is, in air), while the substitution of the other converts it into a water-immersion objective. And in the objectives constructed on Mr. Wenham's system no change in the front glass is needed, all that is necessary for making them work as immersion-lenses being a yet closer approximation of the front lens to the second combination, which can be made by the screw-collar.

Within the last few years, however, the immersion system has undergone a still further and most important development, by the adoption of a method originally suggested by Mr. Wenham (though never carried out by him), and independently suggested by Mr. Stephenson to Professor Abbe of Jena, under whose direction it was first worked out by Zeiss (the very able optician of Jena), who has been followed by Powell and Lealand of London, as well as by several other constructors of achromatic objectives both in England and elsewhere, with complete success. This method consists in the replacement of the water previously interposed between the covering-glass and the front glass of the objective by a liquid having the same refractive and dispersive powers as crown-glass, so that the rays issuing at any angle from the upper plane surface of the covering-glass shall enter the plane front of the objective, without any deflection from their straight course, and without any sensible loss by reflection—even the most oblique rays that proceed from the object keeping their direction unchanged until they meet the back or convex surface of the front lens of the objective. It is obvious that all the advantages derivable from the system of water-immersion will be still more thoroughly attained by this system of "homogeneous" immersion, provided that a fluid can be obtained which meets its requirements. After a long course of experiments, Professor Abbe found that oil of cedar wood so nearly corresponds with crown-glass, alike in refractive and in dispersive power, as to serve the purpose extremely well, except when it is desired to take special advantage of the most divergent or marginal rays, oil of fennel being then preferable. There are, however, strong objections to the use of these essential oils in the ordinary work of research; and it seems not unlikely that a solution of some one or more saline substances will be found more suitable. In addition to the benefit conferred by the water-immersion system, and more completely attained with the homogeneous, it may be specially pointed out that, as no correction for the thickness of the covering-glass is here required, the microscopist can feel assured that he has such a view of his object as only the most perfect correction of an air-objective can afford. This is a matter of no small importance, for while, in looking at a known object, the practiced microscopist can so adjust his air-objective to the thickness of its covering-glass as to bring out its best performance, he cannot be sure, in regard to an unknown object, what appearances it ought to present, and may be led by imperfect cover-correction to an erroneous conception of its structure.

Every improvement in the optical performance of the compound achromatic microscope has called forth a corresponding improvement in the illumination of the objects viewed by it. For the illumination of transparent objects examined by light transmitted through them under low powers of moderate angle a converging pencil of rays reflected upon their under surface by a

concave mirror is generally sufficient—a “condenser” being only needed when the imperfect transparency of the object requires the transmission of more light through it. And the microscopist engaged in ordinary biological studies, who works on very transparent objects with objectives of one-sixth or one-eighth inch focus, or one-tenth inch immersion, will find that the small concave mirror of short focus will generally prove sufficient for his needs. This mirror is usually hung at such a distance beneath the stage that parallel rays falling on it are brought to a focus in the object as it lies on a slip of glass resting on the stage; and thus, when the instrument is used by day, the light of a bright cloud (which is preferable to any other) gives a well-illuminated field, even with the powers last mentioned. But when lamplight is used its divergent rays are not brought to a focus in the object by a mirror that is fixed as just stated; and the distance of the mirror beneath the stage should be made capable of increase (which is easily done by attaching it to a lengthening bar), so as to obtain the requisite focal convergence. Still the best effects of objectives of less than one-fourth inch focus cannot be secured without the aid of an achromatic condenser, interposed between the mirror and the object, so as to bring a larger body of rays to a more exact convergence.

When objectives of still higher power are employed, the employment of such a condenser becomes indispensable; and when the highest powers are being used by lamplight, it is desirable to dispense with the mirror altogether, and to place the flame exactly in the optic axis of the microscope. The condenser should be an achromatic combination, corrected for the ordinary thickness of the glass slip on which the object lies, and capable of being so adjusted as to focus the illuminating pencil in the object.

As it is often found desirable that an object should be illuminated by central rays alone, or that the quantity of light transmitted through it should be reduced (for bringing into view delicate details of structure which are invisible when the object is flooded with light), every microscope should be provided with some means of cutting off the outer rays of the illuminating cone. The “diaphragm-plate” ordinarily used for this purpose is a disk of black metal, pivoted to the under side of the stage, and perforated with a graduated series of apertures of different diameters, any one of which can be brought, by the rotation of the disk, exactly into the optic axis of the microscope. But the required effect can be much more advantageously obtained by the “iris-diaphragm,” in which a number of converging plates of metal are made so to slide over each other by the motion of a lever or screw that the aperture is either enlarged or diminished, while always remaining practically circular as well as central; and in this manner a continuous view of the object is obtained, with a gradational modification of the light.

MICROMETRY.—The microscopist has constant need of some means of taking exact measurements of the dimensions of minute objects, or parts of objects, on the study of which he is engaged; and the accuracy of the operation will of course be proportioned to the correctness of the standard used, and the care with which it is applied.

The instruments employed in microscopic micrometry are of two kinds, the measurement being taken in one by the rotation of a fine screw with a divided milled head, while in the other a slip of glass ruled with lines at fixed distances gives a scale which forms a basis of computation. Each of these has its advantages and its disadvantages.

The stage-micrometer constructed by Fraunhofer was formerly much used by Continental microscopists.

and has the advantage of indicating the actual dimensions of the objects to be measured; but it has the two special disadvantages that a sufficiently small value cannot be conveniently given to its divisions, and that any error in its construction and working is augmented by the whole magnifying power employed. This instrument has now, however, almost entirely given place to one next described.

The screw-micrometer ordinarily used in astronomical measurements (see **MICROMETER**) can be adapted to the eyepiece of the microscope in a manner essentially the same as that in which it is applied to the telescope—its two parallel threads—of which one is fixed and the other made to approach toward or recede from this by the turning of the screw—being placed in the focus of the eyeglass, and being therefore seen as lines crossing its field of view. The object is so focused that its image is formed in the same plane; and, the latter being brought into such a position that one of its ends or margins lies in optical contact with the fixed line, the screw is turned so as to bring the movable line into the like coincidence with the other. But the distance between the lines, as given by the number of divisions of the micrometer, will here be the measurement, not of the object itself, but of its magnified image; and the value of these divisions, therefore, will depend upon the amplification given by the particular objective used. Thus suppose each division of the micrometer to have an actual value of $\frac{1}{100000}$ of an inch, and the visual image to have 100 times the linear dimensions of the object, the theoretical micrometric value of each division would be $\frac{1}{10000000}$ of an inch, or one-millionth, of an inch—a degree of minuteness, however, not practically attainable.

The costliness of a well-constructed screw-micrometer being a formidable obstacle to its general use, a similar method is more commonly adopted, which consists in the insertion of a ruled glass scale into the focus of an ordinary Huygenian eyepiece, so that its lines are projected on the field of view. This scale (ruled, like an ordinary measure, with every fifth line long, and every tenth line double the length of the fifth) is fixed in a brass inner frame, that has a slight motion in the direction of its length within an outer frame, and this last, being introduced through a pair of slits into the eyepiece just above the diaphragm, and being made to occupy the center of the field, is brought exactly into focus by unscrewing the eyeglass as far as may be requisite. When the image of the object to be measured is brought by the focal adjustment of the object-glass into the same plane, a small pushing-screw at the end of the micrometer (whose action is antagonized by a spring at the other end) is turned until one of the long divisions of the scale is brought into optical contact with one edge of the image of the object to be measured, and the number of divisions is then counted to its other edge—the operation being exactly that of laying a rule across the real object if enlarged to the size of its image. The micrometric value of each division of this eyepiece scale must be carefully ascertained for each objective, as in the case of the screw-micrometer, the error arising from inequality of its divisions being eliminated as far as possible by taking an average of several. The principal point of inferiority in this form of micrometer is that, as its divisions cannot be made of nearly so small a value as those of the screw-micrometer, an estimate of fractional parts of them often becomes necessary, which is objectionable as involving an additional source of error. To meet this objection, Hartnack has introduced the diagonal scale used in mathematical instruments before the invention of the vernier.

Under the requirements of modern science the micro-

scope has developed into a wonderful instrument, revealing to man the heretofore hidden secrets of nature, and in some instances placing in his hand a powerful weapon of defense against the inroads of disease and death. As an instance of the latter phase of the subject, we may cite the progress made in the treatment of phthisis. Formerly this disease was held to be identical with another form of pulmonary complaint which we now know to be distinct. But the microscope has revealed to us the presence in the tuberculous deposits in the lungs of baccilli, and now *baccilli tuberculosis* and bronchial complaints known to originate in inflammation brought on by cold or exposure are classed as widely different diseases whose treatment is no less varied than is their character. But it is in determining the nature of the various urinary deposits that the microscope has done most for the science of medicine. By means of the instrument the physician is enabled to determine the morbid constituents of the urine, and thus diagnose with almost unerring certainty the majority of diseases which a few years ago were as a sealed book to him. In the various diseases of the blood, the microscope tells the physician whether there is a sufficiency or a deficiency of any one constituent, revealing to him the presence of too many or too few red corpuscles, or too much or too little of the other elements which go to make up the *ensemble* of healthy vital fluid.

It has also taken an important place as a detector of crime. Many a criminal has to thank the wonderful little instrument for giving to the world the story of his crime, which but for it would have died in his bosom, and he have gone scot-free from punishment. Let a drop of blood shed by murderous hands bespatter a floor, or a wall, or a stone, or the earth—placed under the all-seeing eye of the microscope it is *blood*—it proclaims itself as truly as though an angel had spoken the words to all the earth; even the most delicate chemical test can be seen, and the fact established that it is blood. Or it may be a hair is detached from the head of the victim. Again, the microscope imparts the secret, and it is no longer an open question as to whether it may or may not be a human hair; the very color is revealed—it can be almost matched with others yet unplucked from the victim's head or beard. Perchance in a death struggle with his slayer the victim may have scratched his opponent. Then take the accumulation of material found under his finger-nails, and if there is any human skin to be found there, no matter how minute the particles, the microscope tells the tale. Rightly used by one who understands its power it is hard to limit the field to which the instrument can be applied. Instances can be given in which every one of the examples cited here have occurred in the criminal history of the country. Thanks to the microscope, too, modern bacteriologists have been enabled to ascertain the nature of disease spores, and their best means of destruction. The list of names indebted to the microscope for their fame would include those of Koch, Pasteur, Darwin, and a host of others in all departments of research—physical, biological and philosophical. It has made plain to us what before was mysterious, and year after year but adds to its usefulness. It has taught us how to battle with blight on grapes; it has shown us the nature of curculii; it has put within our grasp the remedy for ænemia; it has identified fermentative products, with mycelium, a kind of fern; and in revealing to our astonished gaze these wonders it has at the same time placed the weapons of defense within our grasp.

MIDAS, king of Phrygia, is one of those half-legendary heroes in whom religious legends have gathered around a real person. The name Midas the king occurs on a very ancient tomb in the valley of the Sangarius,

the legendary seat of the Phrygian kingdom. The Phrygian monarchy was destroyed by the Cimmerians about 670 B.C., and the last king Midas committed suicide by drinking bull's blood.

MIDDELBURG, in Holland, the ancient capital of the province of Zeeland, situated in the middle of the island of Walcheren, is mentioned as early as 1153, and receives the title "town" in a charter granted it in 1227. It has all the characteristics of an old and worn-out place. The population (25,000 in 1739) had sunk to 12,000 or 13,000 by the beginning of the nineteenth century, and has only begun recently to increase again, being 15,939 in 1882.

MIDDLEBORO, a town of the United States, in Plymouth county, Mass., thirty-four miles south of Boston. It has a handsome town hall and a public library, manufactures woolen goods, straw goods, shoes, carriages, etc., and in 1890 had 6,052 inhabitants.

MIDDLESBOROUGH, situated near the mouth of the Tees, on its south bank, in the North Riding of Yorkshire, England, has now become the principal seat of the English iron trade. It is a municipal and parliamentary borough, locally governed by a mayor and corporation, and returns a member to parliament. In the district there are upward of 130 blast furnaces, besides large iron and steel works; and the Thomas-Gilchrist process of making steel promises for Middlesborough importance in the future as a steel entrepôt. The make of pig-iron in 1880 was 1,971,032 tons. Population, 56,000.

MIDDLESEX, an inland county in the southeast of England. On the south it is divided from Surrey and Kent by the Thames, on the east from Essex by the Lea, on the west from Buckinghamshire by the Colne, and on the north from Hertfordshire by a partly artificial and very irregular line. Although with the exception of Rutland it is the smallest county in England, its population is exceeded by that of Lancashire only. Its total area is 181,317 acres, of which 2,592 acres are common or waste lands. The longest straight line that can be drawn in the county is one of nearly twenty-eight miles from the northeastern extremity near Waltham Abbey to the southwestern at Staines. From north to south in the broadest part the distance is about fifteen miles.

Unlike other counties, Middlesex has no high sheriff appointed by the sovereign. It is subject to the city of London, and one of the sheriffs appointed by the lord mayor is sheriff for Middlesex. When Henry I. came to the throne he gave the city an extensive charter, and one of the privileges either granted or confirmed by the king was the perpetual sheriffwick of Middlesex.

The whole of the county is included in the diocese of London, and is divided between the archdeaconries of London and Middlesex. When Henry VIII. created the bishopric of Westminster he allotted the whole county (the parish of Fulham alone excepted) for its diocese. Edward VI., however, dissolved the bishopric in the fourth year of his reign.

The country is divided into six hundreds, which remain the same as they were at the time of the Domesday survey, except that the name of one has been changed: Ossulston (Ossulvestane D.), Edmonton (Delmetone D.), Gore (Gara D.), Elthorne (Heletorne or Helethorne D.), Spelthorne (Speletorne or Spelethorne D.), Isleworth (Honeslaw D., *i.e.*, Hounslow). The division into hundreds is now merely a name, and a record of a former system of local government.

The majority of hospitals are in London, but there is a training hospital at Tottenham, St. John's Hospital at Twickenham, and cottage hospitals at Enfield, Ealing, Hayes. Hillingdon, Sudbury, and Teddington.

The Royal India Lunatic Asylum is at Ealing, and the two county asylums at Holney Hatch and Hanwell.

The county is within the jurisdiction of the central criminal court and also of the metropolitan police (with the exception of the city).

Parliamentary Representation.—There are nine constituencies in Middlesex, returning nineteen members, viz., two for the county, four for the City of London, two for each of the boroughs of Westminster, Finsbury, Marylebone, the Tower Hamlets, Chelsea, and Hackney, with one for the university of London.

In the parliament of 1295 Middlesex was represented by two members; in 1298 London sent two members as well as the county. For the parliament of 1320 and subsequent parliaments London elected four members, but it does not appear that all were allowed to sit. From the fifteenth century, however, the city has always sent four members to parliament. In 1547 Westminster first sent her two members, and from that time until 1832 the only seats were those for the county and the two boroughs. In 1832 the boroughs of Finsbury, Marylebone, and Tower Hamlets were added, and in 1866 the boroughs of Chelsea and Hackney and the university of London.

History.—The district now included in Middlesex was largely occupied by forest up to a comparatively recent period, and its population must always have been very sparse. A few prehistoric remains have been discovered at various times—bones of the elephant, hippopotamus, deer, etc., at Old Brentford, elk horns near Chelsea Hospital, fossil teeth, fish, fruit, etc., at Highgate, and quite recently, in 1879, while the foundations were being dug out for Drummond's New Bank at Charing Cross, a large number of prehistoric animal remains. Flint instruments have also been found to cover a considerable area. During the British period the district is supposed to have been inhabited by Trinobantes, but the late Doctor Guest affirms that the valley of the Lea was the western boundary of that tribe. In answer to the question, What became of the district between the Lea and the Brent? this great authority states that the district was merely a march of the "Catuvellauni," a common through which ran a wide trackway, but in which was neither town, village, nor inhabited house. Doctor Guest also declares that the boundaries of the Catuvellaunian state, a central kingdom formed or much extended by Cassivellaunus, can be traced in part along the northern limit of Middlesex by following an earthwork called Grimesditch "from Brockley Hill to the woodland of the Colne Valley and thence to the Brent, and down the Brent to the Thames." Some earthworks and encampments still exist which are attributed to the Britons.

When the country was under Roman rule great improvements, due to the growing importance of Londinium, were made in this district. Several roads in connection with the city must have been constructed, more especially the great northern and eastern roads. Doctor Guest does not believe that the present Watling street could have had any connection with the Watling street which came down the Edgware road, passed along by Park lane, and crossed the Thames at Westminster. In the Antonine Itinerary mention is made of three stations, viz., Londinium, Sulloniacæ, and Pontes. Sulloniacæ is now Brockley Hill; Pontes is supposed by Stukeley to mean Staines, but Horsley held that it was intended for Old Windsor, and others supported the claims of Colnbrook and Longford. Roman camps have been found in many parts of the county, and Doctor Stukeley supposed that the Brill, near St. Pancras, was the site of the battle between Boadicea

and the Roman legions which has left a slight record in the name of Battle Bridge. The Roman remains found at different times are too numerous to mention here in detail. Coins, urns, and tiles were found at Enfield, a sepulchral urn at Hampstead, and numerous gold coins and ornaments at Bentley Priory, Great Stanmore, in 1781.

Cowey Stokes, about a furlong west of Walton Bridge, is supposed to be the locality of the ford by which Julius Cæsar crossed the Thames. Cæsar makes special mention of the sharp stakes which he had to encounter, and Bede says that the remains of the stakes were to be seen in his day. Camden was the first to fix upon this as the spot where Cæsar crossed, and he is supported by Doctor Guest, but the identification is not undisputed. Although a ford existed here as late as 1807, and stakes were found up to the end of the eighteenth century, it has been affirmed that they were placed in their position with another object than to oppose an enemy's progress. Roman remains have been found at Shepperton near Halliford, at the Middlesex end of the ford. A vase was dug up in 1817, and the remains of a Roman cemetery have also been discovered.

As to the earliest Saxon occupation we are left very much to conjecture, and the name itself is somewhat of a puzzle. It is evident that no tribe could have obtained the name of Middle Saxons until after the settlement of the districts on each side of it by the East and the West Saxons. As Middlesex was for a period dependent upon the kingdom of Essex, it is probable that the name did not come into use until London had become a Saxon city, although there is reason to believe that previously Saxon settlements had been made on several places by the river and elsewhere. Bede tells us that London was in the hands of King Sæberet in 604, and was then the chief town of Essex. Just a century afterward—that is, 704—the king of the East Saxons granted away land at Twickenham, showing that Middlesex was then dependent upon Essex. It is worthy of note that the two districts now forming the counties in which London and Southwark are situated were separated from the kingdoms to which they originally belonged probably on account of the importance of the city of London and the borough of Southwark, Middlesex from the kingdom of Essex and Surrey or the South Ridge (A.-S. *Suð-rige*) from the kingdom of Kent.

Middlesex appears never to have been independent. The administrative shire was let to the men of London and their heirs to be held in farm of the king and his heirs, and the "subject share has to submit to the authority of the sheriffs chosen by the ruling city."

MIDDLETON, a market and manufacturing town of Lancashire, is situated on the Irk, near the Rochdale Canal, and on the Lancashire and Yorkshire Railway, about five miles north of Manchester and four west of Oldham. The population of the urban sanitary district of Middleton and Tonge in 1881 was 18,952.

MIDDLETON, CONYERS, the earliest and most eminent example of the spirit of theological rationalism in the English Church of the eighteenth century, was born at Richmond in Yorkshire, on December 27 (or, according to another account, on August 3), 1683, and died in 1750.

MIDDLETON, THOMAS, held a leading place among the dramatists of the reign of James I. He was born about 1570 and died in 1627.

MIDDLETOWN, a city and port of entry of the United States, and one of the shire towns of Middlesex county, Conn., lies on the right bank of the Connecticut river, about thirty miles from its mouth, directly opposite the well-known Portland quarries, and twenty-four miles from New Haven by rail. Middletown is a

place of considerable attractiveness, and the views from the higher points are particularly fine. On the high ground stand the handsome buildings of the Wesleyan (Methodist Episcopal) University. The institution, mainly organized by Wilbur Fisk, D.D., was chartered in 1831. It has a library of about 30,000 volumes. Since 1872 the courses of the university have been open to both sexes. The Berkeley Theological School is also located here. A hill one and a quarter miles to the southeast of the city is occupied by the State General Hospital for the Insane, the principal building having a frontage of 768 feet, and the grounds extending to 230 acres; and on another hill to the southwest of the city stands the State Industrial School for Girls. As vessels drawing ten feet of water can reach its wharves, Middletown carries on a considerable trade by the river. Population (1890), 9,012.

MIDDLETOWN, a manufacturing village of the United States, in Wallkill township, Orange county, N. Y., fifty-five miles north-northwest of New York, at the junction of four railroads. It is a clean, well-built place, in the midst of a fine dairy-farming and stock-raising district, manufactures saws, files, felt hats, blankets, agricultural implements, printers' materials, etc., and is the seat of the State Homœopathic Insane Asylum. The population was 11,977 in 1890.

MIDDLETOWN, a flourishing manufacturing and commercial town in Butler Co. lies on the east bank of the Miami river, and on the Miami canal, thirty-four miles north of Cincinnati. The chief industries of the city are the manufacture of paper and tobacco. Middletown contains three banks, three newspaper offices, twelve churches, and high and graded schools. Two lines of railway pass through the city. Population, 7,673.

MIDHURST, an ancient parliamentary borough and market-town of Sussex, is picturesquely situated on a gentle eminence above the south bank of the west Rother, on three railway lines, fifty miles southwest of London and twelve north from Chichester.

MIDIAN was one of the peoples of North Arabia whom the Hebrews recognized as distant kinsmen, representing them as sons of Abraham's wife Keturah.

MIDNAPUR, a district in the lieutenant-governorship of Bengal, India, is bounded on the north by Bânkurâ and Bardwân, on the east by Hooghly and Howrah, on the south by the Bay of Bengal, and on the west by Singbhûm and Mânabhûm, with an area of 5,982 square miles.

MIDNAPUR, chief town and headquarters station of the above district, is situated on the north bank of the Kasâi river, with a population in 1872 of 31,491.

MIDRASH. The practical significations of *Midrash*, taken in historical order, are as follows:—(1) a book of records; (2) a recension of older, especially historical, materials; (3) search in and explanation of the Scriptures, notably the Pentateuch (in which case the plural is invariably *Midrashoth*); (4) theory as distinguished from practice; (5) a college for study and teaching; (6) an *Agadic* (that is, a free) explanation, in contradistinction to an *Halakhic* one; (7) a collection of such free explanations (in which case the plural is *Midrashim* and occasionally also *Midrashoth*). Of these seven significations (1) and (2) are to be found in the Bible, (3) and (4) are mentioned for the first time in the *Mishnah*, (5) is to be met with in the *Midrash*, while (6) and (7) are to be found in early Rabbinic writings.

The *Midrash*, from whatever point of view it may be regarded, is of the highest value. It is of the highest value, of course, to the Jew as Jew first, inasmuch as he finds there recorded the noblest ideas, sayings, and teachings of his venerable sages of early times. In the next place it has value to the Christian as Christian.

since only by these ideas, teachings, reasonings, and descriptions can the beautiful sayings of the Founder of Christianity, the reasonings of the apostles, and the imagery of the sublime but enigmatical Apocalypse be rightly understood. But its importance appeals also to the general scholar, because of the inexhaustible mines of information of all kinds it contains. The philologist will find here numerous hints on lexicography and grammar, chiefly, of course, of the Semitic languages, but also of other tongues, notably Greek and Latin. The historian will gather here a rich harvest on geography, chorography, topography, chronology, numismatics, etc. The philosopher will find here abundant and valuable notices on logic, psychology, metaphysics, theology, theosophy, æsthetics, rhetoric, poetry, mathematics, geometry, astronomy, zoölogy, botany, biology, morphology, chemistry, medicine, physics, etc. The statesman—particularly if he be inclined to follow the psalmist's advice—"from the ancients I gather understanding"—will find here valuable information on ancient ethnography in the full sense of the term—politics, political economy, law, military science, naval affairs, etc.

MIEDZYRZECZ PODLASKI, a district town of Russian Poland, in the government of Siedlce, sixteen miles to the east of the government capital, on the railway between Warsaw and Brest-Litovskiy. Its 10,000 inhabitants—half of whom are Greek nonconformists, and half Jews and Poles—carry on some trade in bristles, and pursue minor industries.

MIERIS, the name of a family of artists who practiced painting at Leyden for three generations in the seventeenth and eighteenth centuries.

I. FRANS VAN MIERIS, the elder, son of Jan van Mieris, a goldsmith and diamond setter, was born, according to Houbraken, at Leyden, on April 16, 1635, and died there on March 12, 1681.

II. WILLEM VAN MIERIS, born in 1662, died in 1747, son of Frans. His works are extremely numerous.

III. FRANS VAN MIERIS, the younger, born in 1689, died in 1763, also lived on the traditions of his grandfather's painting-room.

MIGNARD, PIERRE, called—to distinguish him from his brother Nicholas—Le Romain, was the chief French portrait-painter of the seventeenth century. He was born at Troyes in 1610, and came of a family of painters. In 1695 he died while about to commence work on the cupola of the Invalides.

MIGNONETTE (*i.e.*, "little darling"), the name given to a popular garden flower, the *Reseda odorata* of botanists, a "fragrant weed," as Cowper calls it, highly esteemed for its delicate but delicious perfume. The mignonette is generally regarded as being of annual duration, and is a plant of diffuse decumbent twiggy habit, scarcely reaching a foot in height, clothed with bluish lanceolate entire or three-lobed leaves, and bearing longish spikes—technically racemes—or rather insignificant flowers at the ends of the numerous branches and branchlets. The plant thus naturally assumes the form of a low, dense mass of soft, green foliage studded over freely with the racemes of flowers, the latter unobtrusive and likely to be overlooked until their diffused fragrance compels attention. The native country of the original or typical mignonette has sometimes been considered doubtful, but according to the best and latest authorities it has been gathered wild on the North African coast near Algiers, in Egypt, and in Syria.

MIGUEL, MARIA EVARIST, usually known as DON MIGUEL, whose name is chiefly associated with his pretensions to the throne of Portugal, was the third son of King John VI. of Portugal, and of Carlotta Joachima, one of the Spanish Bourbons; he was born

at Lisbon on October 26, 1802. On the sudden death of John VI. in May, 1826, Pedro of Brazil, his eldest son, renounced the crown in favor of his daughter Maria da Gloria, on the understanding that she should become the wife of Miguel. The last-named got himself proclaimed sole legitimate king of Portugal in July. The power which he now enjoyed he wielded in the most tyrannical manner. The public opinion of Europe became more and more actively hostile to his reign, and after the occupation of Oporto by Don Pedro in 1832, the destruction of Miguel's fleet by Captain (afterward Sir Charles) Napier off Cape St. Vincent in 1833, and the victory of Saldanha at Santarem in 1834, Queen Christina of Spain recognized the legitimate sovereignty of Maria, and in this was followed by France and England. Don Miguel capitulated at Evora on May 29, 1834, renouncing all pretensions to the Portuguese throne, and solemnly promising never thenceforward to meddle in Peninsular affairs. He lived for some time at Rome, where he enjoyed papal recognition, but afterward retired to Bronnbach, in Baden, where he died on November 14, 1866.

MIGULINSKAYA, a Cossack village of Russia, in the government of the Don Cossacks, and in the district of Ust-Medveditsa, seventy-nine miles to the west of that town, on the left bank of the Don.

MIKHAILOVSKAYA, a Cossack village of Russia, in the government of the Don Cossacks, and in the district of Khopersk, fourteen miles to the northwest of Uryupino, on the low left bank of the Khoper, which is inundated when the river is full.

MILAN, a city of Italy, situated near the middle of the Lombard plain, on the small river Olona. It lies twenty-five miles south of the Alps at Como, thirty miles north of the Apennines, twenty miles east of the Ticino, and fifteen miles west of the Adda.

The commune of Milan consists since 1873 of the city within the walls (area 1,513 acres), and the so-called Corpi Santi without the walls (area 15,415 acres). The population of the whole area amounted to 321,839 in 1881—the city within the walls contributing 214,004.

Milan is built in a circle, the cathedral being the central point. The city is surrounded by a wall seven miles in circumference, and immediately outside the wall a fine, broad thoroughfare makes the circuit of the city. The streets inside are for the most part narrow and crooked.

Among the buildings of Milan the most important is the cathedral, begun under Gian Galeazzo Visconti, in 1386. It is built of brick faced in marble from the quarries which Visconti gave in perpetuity to the cathedral chapter. The name of the original architect is not known, but it is certain that many German master masons were called to Milan to assist the Italian builders. It is 477 feet in length and 183 in width; the nave is 155 feet high, the cupola 226 feet, and the tower 360 feet. The work was continued through many centuries, and after the designs of many masters, notably of Amadeo, who carried out the octagon cupola, and of Tibaldi, who ornamented the doors and windows of the façade in the sixteenth century. The work was finished under Napoleon, in 1805. The style is Gothic, though its purity is destroyed by the introduction of Romanesque windows and portals on the façade. The form of the church is that of a cross. Inside there are double aisles, and aisles in the transepts. The roof is supported by fifty-two columns, with canopied niches for statues instead of capitals. The windows of the tribune contain brilliant painted glass. To the right of the entrance is the tomb of Archbishop Heribert, the champion of Milanese liberty, next to that is the tomb of Otho Visconti, founder of that family as a reigning house, and in

the right transept the monument of Giacomo dei Medici, the corsair of Como, brother of Pope Pius IV. and uncle to Saint Carlo Borromeo. Under the dome, in a crypt, lies the embalmed body of this cardinal saint (1538-84), canonized for his good deeds during the great famine and plague of 1576. The body is contained in a silver sarcophagus faced with rock-crystal. The roof of the cathedral is built of blocks of white marble; and the various levels are reached by staircases carried up the buttresses; it is ornamented with turrets, pinnacles, and two thousand statues.

The royal and archiepiscopal palaces are both worthy of note. Milan is rich in works of art. The picture gallery of the Brera is one of the finest in Italy. It possesses Raphael's famous *Sposalizio* and contains many frescoes by Luini, Gaudenzio Ferrari, and Bramantino.

The industries of the district have increased very rapidly since the union of Italy, and the city is now the chief commercial center in North Italy. The principal industry of Milan and the Milanese is the production and manufacture of silk. Population, about 300,000.

MILAZZO, a city of Italy, in the province of Messina, in Sicily, twenty and one-half miles west of Messina, is built on the eastern shore of the Bay of Milazzo, partly on the isthmus of the promontory, Capo Milazzo, which divides it from the Bay of Olivieri.

MILDEW (explained as "meal-dew" or, with more probability, as "honey-dew") is a popular name given to various minute fungi from their appearance and, from the sudden, dew-like manner of their occurrence. Like many other popular names of plants, it is used to denote different species which possess very small botanical affinity. The term is applied, not only to species belonging to various systematic groups, but also to such as follow different modes of life. The corn-mildew, the hop-mildew, and the vine-mildew are, for example, parasitic upon living plants, and the mildews of damp linen and of paper are saprophytes, that is, they subsist on matter which is already dead. It is generally possible to draw a distinct line between parasitic and saprophytic fungi; a species which attacks the living body of its host does not grow on dead matter, and *vice versa*. For information regarding fungi generally see FUNGUS.

MILETUS, an ancient city on the southern shore of the Latmic Gulf, opposite the mouth of the Mæander. Before the Ionic migration it was inhabited by the Carians (*Iliad* ii. 876; Herod. i. 146); other authorities call the original people Leleges, who are always hard to distinguish from Carians. The Greek settlers from Pylus under Neleus massacred all the men in the city, and built for themselves a new city on the coast. It occupied a very favorable situation at the mouth of the rich valley of the Mæander, and was the natural outlet for the trade of southern Phrygia; it had four harbors, one of considerable size. Its power extended inland for some distance up the valley of the Mæander, and along the coast to the south, where it founded the city of Iasus.

MILFORD, a seaport, market-town, and contributory parliamentary borough (one of the Pembroke district) of Pembrokeshire, South Wales, is finely situated on the north side of Milford Haven, about eight miles west-northwest of Pembroke.

MILFORD, a post-village of the United States, in Worcester county, Mass., lies thirty-four miles southwest of Boston, at the junction of the Milford branch of the Boston and Albany Railroad with the Hopkinton, Milford and Woonsocket Railroad. It is one of the principal seats of the boot manufacture in New England, and also produces large quantities of straw goods. The population was 8,780 in 1890.

MILICZ, or MILITSCH, of Kremsier, Moravia, was

the most influential among those preachers and writers in Moravia and Bohemia who during the fourteenth century paved the way for the reforming activity of Huss and through him for that of Luther. He was born about 1325, and died in 1374.

MILITARY FRONTIER, a narrow strip of Austrian-Hungarian territory stretching along the borders of Turkey, which had for centuries a peculiar military organization, and from 1849 to 1873 constituted a crown-land. As a separate division of the monarchy it owed its existence to the necessity of maintaining during the fifteenth, sixteenth, and seventeenth centuries a strong line of defense against the invasions of the Turks, and may be said to have had its origin with the establishment of the captaincy of Zengg by Matthias Corvinus and the introduction of Uskoks (fugitives from Turkey) into the Warasdin district by the emperor Ferdinand I. By the close of the seventeenth century there were three frontier "generalates"—Carlstadt, Warasdin, and Petrinia (the last also called the Banal). After the defeat of the Turkish power by Prince Eugene it was proposed to abolish the military constitution of the frontier, but the change was successfully resisted by the inhabitants of the district; on the other hand, a new Slavonian frontier district was established in 1702, and Maria Theresa extended the organization to the march-lands of Transylvania (the Szekler frontier in 1764, the Wallachian in 1766).

MILITARY LAW consists of the statutes, rules of procedure, royal warrants, and orders and regulations which prescribe and enforce the public obligations of the officers, soldiers, and others made subject to its provisions. Its essential purpose is the maintenance of discipline; but it also includes the administrative government of the military forces of the state, more especially in the matters of enlistment, service, and billeting. The term "martial law" sometimes applied to it is, as regards modern times at least, a misnomer. For martial law as it is now understood applies not only to military persons but to the civil community, and may be described generally as the abrogation of ordinary law and the substitution for it of military force uncontrolled save by what, in the discretion of the commanding general, may be considered the necessity of the case.

The persons subject to military law are the officers on the active list and the soldiers of the regular forces (including the marines), the permanent staff of the auxiliary (*i.e.*, the militia volunteer) forces, and the officers of the militia.

When a person subject to military law commits an offense he is taken into military custody, which means either arrest in his own quarters or confinement. He must without unnecessary delay be brought before his commanding officer, who upon investigating the case may dismiss the charge if in his discretion he thinks it ought not to be proceeded with, or may take steps to bring the offender before a court-martial.

MILITARY TACTICS. See WAR.

MILITIA. The constitution of the United States provides for the foundation of a militia, declaring such an organization necessary for the protection of the State. Soon after the organization of the government, the House of Representatives appointed a committee to organize a militia. The next year the secretary of war, Knox, submitted his plans for organizing the forces. These plans combined the following features: Every male arriving at the age of eighteen was to serve thirty days of each year for the first two years, and ten days the following year, in the camps of instruction; no citizen could exercise his political and civil rights unless he were a member of the militia; all citizens between twenty-one and forty-five were to attend four days'

drill each year, and be enrolled in the main corps of the militia; all over forty-five and under sixty were to be enrolled in the reserve corps, and attend drill two days each year, for inspection of arms. The government was to bear all expenses of the organization. These features were embodied in a bill and presented to Congress, but as passed it was altered so that very little of the original was left. The law then passed is the one now in force, and its main features are, that all citizens between eighteen and forty-five shall serve in militia, and arm and equip themselves at their individual expense. This law was so crude and inadequate that it was a subject of criticism as soon as passed, and it had been tinkered at from time to time up to the threatened troubles between France and the United States, at which period the formation of a provisional army so engrossed the attention of the government that the militia was forgotten for the time being. The next step in the reformation of the militia system was attempted by President Jefferson, who recommended that only citizens between eighteen and twenty-six be enrolled, inasmuch as owing to increased population this force was thought to be sufficient. After considerable discussion the matter was dropped, no permanent result having been reached.

President Madison also recommended amendment of the militia laws, but his recommendation was barren of any results. From this time down to the outbreak of the civil war various futile attempts were made to amend the laws and improve the system. In the meantime there had sprung up a volunteer system which had supplanted the general militia, which, by the time of the outbreak of the Mexican war, was virtually dead. These volunteer companies made a brilliant record during the campaign of that war, and were an earnest of the splendid armies which, but little more than a decade after, battled for and against the continuance of the Union and filled the world with astonishment at the record of their deeds. After the war of secession was over the subject of the militia laws was again taken up, and although various plans were proposed nothing was done and the matter virtually stands as it has done for one hundred years. A feature common to all the plans latterly proposed was the substitution of a volunteer militia for the compulsory system. The law as it now stands is so utterly inapplicable that it is entirely ignored. The militia forces if levied under this law, would compose the largest body of armed men the world has ever seen, aggregating 6,500,000 of men. The following table gives the estimate of men available for military duty:

Maine.....	78,458	Texas.....	150,000
New Hampshire....	48,770	Arkansas.....	100,000
Vermont.....	44,366	Kentucky....	218,000
Massachusetts.....	225,461	Tennessee.....	239,564
Rhode Island.....	42,969	Ohio.....	500,000
Connecticut.....	73,961	Indiana.....	320,546
New York.....	567,669	Michigan.....	300,000
New Jersey.....	248,127	Illinois.....	350,000
Pennsylvania.....	422,371	Missouri.....	300,000
Delaware.....	24,073	Wisconsin.....	250,000
Maryland.....	89,344	Minnesota.....	120,000
Virginia.....	215,200	Iowa.....	197,456
West Virginia.....	100,000	Nebraska.....	46,000
North Carolina.....	200,000	Kansas.....	121,070
South Carolina.....	95,856	Nevada.....	20,000
Georgia.....	180,000	Oregon.....	14,878
Florida.....	25,903	California.....	114,565
Alabama.....	170,000	Colorado.....	29,000
Mississippi.....	135,178		
Louisiana.....	137,973	Grand aggregate...	6,516,758

The present organization of State troops—the National Guards—are entirely volunteer. They are to a great degree dependent on their own exertions for equipment in all respects save that of mere guns and ac-

coutrements. In some of the States the local government has taken great pains to foster their troops, but as yet they receive no help from the general government save in the matter of arms which are issued to each State by the government on the call of the governor of the State. The soldier must generally furnish his own uniform, etc., and the taste of each particular company in some of the States is consulted as regards the uniform selected, the result being a most incongruous appearance of the different bodies of troops when mustered together, there appearing even in the same regiment all the colors of the rainbow. There has been a movement made to abolish this state of affairs and to substitute therefor, a regulation compelling the adoption of an invariable uniform for the National Guard of all the States. The number of organized troops at present in each State is as follows:

Maine	875	Texas	1,206
New Hampshire.....	1,948	Arkansas	16,377
Vermont.....	670	Kentucky.....	722
Massachusetts.....	4,028	Tennessee.....	41,28
Rhode Island.....	1,978	Ohio.....	8,374
Connecticut.....	3,088	Indiana.....	1,544
New York.....	20,280	Michigan.....	1,799
New Jersey.....	3,223	Illinois.....	7,394
Pennsylvania.....	9,750	Missouri.....	1,347
Delaware.....	90	Wisconsin.....	1,824
Maryland.....	1,245	Minnesota.....	204
Virginia.....	2,635	Iowa.....	4,581
West Virginia.....		Nebraska.....	696
North Carolina.....	2,783	Kansas.....	2,047
South Carolina.....	11,805	Nevada.....	
Georgia.....		Oregon.....	641
Florida.....	5,503	California.....	2,597
Alabama.....		Colorado.....	602
Mississippi.....	9		
Louisiana.....	2,757	Grand aggregate....	128,750

MILK is the fluid secreted by the mammary glands of the division of vertebrate animals called *Mammalia*. These glands are in a rudimentary form in the Monotremes. In *Ornithorhynchus* these is no nipple, but the mouth and tongue are closely applied over the area on which the ducts open, and the fluid is withdrawn by suction on the part of the young and compression of the gland by the mother. In *Echidna* the ducts of the gland open into a small pouch, foreshadowing the larger pouches of marsupials. In marsupials the glands are more compact, and have a greater number of lobules. They are found behind the marsupial depressions or those of the pouch; they are not fewer than two on each side nor more than thirteen, six on each side and one midway. The ducts, long and slender during lactation, open on a nipple which is covered by a reflection of the skin at the back of the pouch, thus forming a kind of hood or sheath. The nipple is protruded beyond the hood during lactation, and is much elongated. The number of these nipples bears a relation to the number of young at a birth; thus the kangaroo, with one at a birth, has four nipples (two, generally the anterior pair, being in use), while the Virginia opossum, which produces six or more at a birth, has thirteen nipples. Rodents show a corresponding provision for the nourishment of the young in the number of nipples. A seeming exception is the common guinea-pig, which frequently has eight, ten, or twelve young at intervals of two or three months, and yet the mother has only two teats to serve them, turn and turn about; the original stock of the domestic species breeds, however, only once annually, and has but one to two young, so the domestic variety is a curious anomaly due to the artificial circumstances of its life. In the porcupines there are two nipples, one midway between the fore and hind leg, and the other midway between this and the base of the fore leg. In the coypu, a creature often carrying its young on its back while it swims

across rivers, the teats project from the flanks near the shoulders, and are of considerable length, so that the young readily reach them. The *Insectivora* have, as a rule, more nipples than are found in any other order. Thus in the tenrec (*Centetes*) there are as many as twenty-two, and they are rarely fewer than fourteen, spread out in pairs from the pectoral to the inguinal regions. There are ten teats in the common hedgehog, six to eight in moles and shrews, two in sloths and armadillos. In *Cetacea* there are two long, narrow, flat glands lying between the dermal and abdominal muscles, with the subcutaneous blubber separating them from the skin. The peculiarity of the arrangement in these animals, where suckling is performed under water, is the large size of the central duct, which acts as a kind of reservoir, so that the young may obtain a considerable supply in a very short time. It would appear also that when suckling takes place the nose of the young is above the surface of the water. Among ungulates, in the elephant the glands and teats are between the forelegs; in the rhinoceros they are inguinal; in the mare and ass the glands are two in number, and are found between the thighs, about nine inches in front of the vulva; the tapir has two inguinal nipples, the peccary two ventral and two inguinal, the wild sow eight nipples, while in the domestic breeds there are at least ten, extending from the pectoral to the inguinal regions. Ruminants have the glands aggregated into a round mass in the inguinal region, pendulous in full function, divisible into two glands, each of which has a large reservoir. When in use the teats, one pair or two pairs being the number, in connection with the reservoirs become so large as to receive the special name of "udder." All the deer tribe, camels, the giraffe, and all kinds of cows have four teats; most antelopes and the gazelles have two teats, while a few antelopes have four. As to *Carnivora*, the felines have usually six nipples; the wolf, jackal, fox, dog have usually eight; the seals and the walrus have four, the otters two, the weasels six, the bears six; and in the kinkajou (*Cercoleptes*) the number is reduced to two. Among *Quadrumania*, the aye-aye (*Chiromys*) has only one pair of nipples, about an inch and a half in front of the vulva; many lemurs have in addition to those a pectoral pair; in all the platyrrhine and catarrhine *Quadrumania* there is only one pair of glands, restricted to the pectoral region. Here the teats are between the fore legs, and the young clings to the mother's breast in human fashion, but there is no protrusion of the breast as in the human being. (For further details see Owen's *Anatomy of Vertebrates*, vol. iii., p. 769.)

In the human race the glands are two in number, forming, along with the skin and fat, two rounded eminences, one on each side, on the front of the thorax. They extend from the third to the sixth or seventh rib, and from the side of the sternum to the axilla. In the center projects a small conical body, the *nipple*. Around the nipple is a colored circle, or *areola*, which is darker during pregnancy, and even in women who have borne children, than in the virgin state. The surface of the nipple is wrinkled, and with a magnifying glass is seen to be covered with papillæ. It is perforated by numerous openings, the mouths of the milk ducts. The tissue of the nipple contains numerous minute blood-vessels, and it has at the base muscular fibers arranged in concentric circles and in radiating bands. It has much of the character of erectile tissue, as in the *corpora cavernosa* of the penis, becoming turgid, firm, and prominent from excitement. The base of the gland lies on the pectoral muscle, a thin layer of fascia intervening. The surface is covered with fat, which gives it the smooth rounded outline. It is amply supplied with blood by the

long thoracic artery, some other minute branches of the axillary artery, the internal intercostal artery, and the subjacent intercostals. The nerves come from the anterior and middle intercostal cutaneous branches, and the nipple is especially sensitive. The gland is composed of numerous lobes bound together by connective and adipose tissue, and each lobe is formed of smaller lobules. Each lobe has an excretory duct, and these ducts, from fifteen to twenty in number, converge toward the areola, beneath which they are dilated so as to form sinuses from one-sixth to one-fourth of an inch in caliber. From these sinuses arise the ducts which open on the surface of the nipple.

The milk of various domesticated animals is more or less used by man for food. The specific gravity of milk ordinarily ranges from 1.029 to 1.033, very seldom reaching 1.035 or falling so low as 1.027. In chemical constitution it consists of an emulsion of fatty globules (cream) in a watery alkaline solution of caseine, and a variety of sugar, peculiar to milk, called lactose. The fat (which when separated we know as butter) and the lactose constitute the carbonaceous portion of the milk regarded as food. The caseine, which forms the principal constituent of cheese, and a certain proportion of albumen which is present, form the nitrogenous, while the complex saline substances and water are the mineral constituents. These various substances are present in the proportions which render milk a perfect and typical food suitable to the wants of the young of the various animals for whom it is provided by nature. The milk of all animals, so far as is known, contains them, although they are present in somewhat different proportions. It is probable that the milk of ruminants possesses certain physical and physiological distinctions from that of non-ruminant animals, which will account for the virtues attributed to the milk of the ass and mare. For milk in its industrial aspect see DAIRYING.

MILL, JAMES, historian and political and mental philosopher, was born April 6, 1773, in the little village called Northwater Bridge (Bridge of North Esk), in the parish of Logie-Pert, in the county of Forfar, Scotland. In October, 1798, he was licensed as a preacher, but seems to have preached very seldom. His years from 1790 to 1802, besides being occupied with incessant studies extending into history and moral and political philosophy, were devoted to various tutorships.

Failing to find a career to his mind in Scotland, in 1802 he went to London in company with Sir John Stuart, then member of parliament for Kincardineshire. He soon obtained literary occupation, to which he applied himself with untiring energy. His first important venture was to start a periodical on a new plan, entitled *The Literary Journal*, which began to appear in January, 1803, and continued under his editorship till the end of 1806. It was the most comprehensive in its aims of any periodical hitherto in existence, being a summary view of all the leading departments of human knowledge.

For two or three years, from 1805 onward, Mill was editor, but at last gave it up, partly on conscientious grounds, although in conducting it he never lent himself to the expression of any illiberal views, but often made it the vehicle of the opposite.

In 1804 he wrote a pamphlet on the *Corn Trade*, advocating the impolicy of a bounty on the exportation of grain. This was the beginning of his career as a political economist. In 1805 he published a translation of Villers' work on the *Reformation*, an unsparing exposure of the vices of the papal system. It was about the end of 1806 that he entered upon the composition of the *History of India*.

In the twelve years between 1806 and 1818 he wrote

a great many articles for various periodicals. In 1808 he began to write for the *Edinburgh Review*, and contributed steadily till 1813. In 1811 a periodical named the *Philanthropist* was started by William Allen, and published in quarterly numbers till 1817. Mill co-operated with Allen both in the writing and in the management. In 1814 Macvey Napier engaged him to contribute to the supplement to the fifth edition of the *Encyclopædia Britannica*. Many of the articles became notable. In 1818 was published the *History of India*, which had a great and speedy success.

In 1824 Bentham projected the *Westminster Review*, and Mill was a principal writer for three years. In 1829 appeared the *Analysis of the Human Mind*. From 1831 to 1833 he was largely occupied in the defense of the East India Company during the controversy attending the renewal of its charter, he being in virtue of his office the spokesman of the court of directors. In 1834 Sir William Molesworth projected the *London Review*, and Mill contributed to it during the last two years of his life. His last published book was the *Fragment on Mackintosh*, which appeared in 1835. He died on June 23, 1836.

MILL, JOHN, editor of an historically important critical edition of the New Testament, was born about 1645 at Shap, in Westmoreland, England, and died in 1707.

MILL, JOHN STUART, son of JAMES MILL (*q.v.*), was born in London on May 20, 1806. His education was from first to last undertaken by his father, and is likely long to remain a standing subject for wonder and discussion. Much of the wonder is no doubt due to his father's monstrous inversion of custom, the boy being set almost as soon as he could speak to work at our time-honored subjects of secondary and higher education. He was taught the Greek alphabet at the age of three, and one of his earliest recollections, as he has recorded in his autobiography, was learning lists of common Greek words with their English meanings, written for him by his father on cards. By his eighth year he had gone through in the original a great many Greek books.

Most of Mill's fifteenth year was spent in France in the family of Sir Samuel Bentham. On his return in 1821 he continued his old studies with the addition of some new ones. One of the new studies was Roman law, which he read with John Austin, his father having half decided on the bar as the best profession open to him. Another was psychology. In 1823, when he had just completed his seventeenth year, the notion of the bar as a livelihood was abandoned, and he entered as a clerk in the examiner's office of the India House, "with the understanding that he should be employed from the beginning in preparing drafts of dispatches, and be thus trained up as a successor to those who then filled the highest departments of the office."

Mill's work at the India House, which was henceforth his livelihood, did not come before the public, and those who have scouted his political writings as the work of an abstract philosopher, entirely unacquainted with affairs, have ignored the nature of his duties. From the first he was more than a clerk, and after a short apprenticeship he was promoted, in 1828, to the responsible position of assistant examiner.

To return to his extra-official activity, which received an immense impulse about the time of his entering the India House from what must strike a man of the world as a strange source. The reading of Dumont's exposition of Bentham's doctrines in the *Traité de Législation* was an epoch in Mill's life. It awoke in him an ambition as enthusiastic and impassioned as a young man's first love.

The enthusiast of seventeen, burning to reorganize human affairs so as to secure the greatest happiness of the greatest number, set siege to the public mind through several approaches. He constituted a few of his youthful friends, imbued with the principles of his new creed, into a society which he called the "Utilitarian" Society, taking the word, as he tells us, from one of Galt's novels. Two newspapers were open to him—the *Traveller*, edited by a friend of Bentham's, and the *Chronicle*, edited by his father's friend Black. One of his first efforts was a solid argument for freedom of discussion, in a series of letters to the *Chronicle* apropos of the prosecution of Richard Carlile. But he watched all public incidents with a vigilant eye, and seized every passing opportunity of exposing departures from sound principle in parliament and courts of justice. Another outlet was opened up for him in 1824 by the starting of the *Westminster Review*, and still another in the following year in the *Parliamentary History and Review*. This year also he found a congenial occupation in editing Bentham's *Rationale of Judicial Evidence*. Into this he threw himself with zeal. And all the time, his mind full of public questions, he discussed and argued eagerly with the many men of promise and distinction who came to his father's house. He engaged in set discussions at a reading-society formed at Grote's house in 1825, and in set debates at a Speculative Society formed in the same year.

In 1826 Mill could look back to four years of eager toil. What were the results? He had become convinced that his comrades in the Utilitarian Society, who never numbered more than ten, had not the stuff in them for a world-shaking propaganda; the society itself was dissolved; the *Parliamentary Review* was a failure; the *Westminster* did not pay its expenses; Bentham's *Judicial Evidence* produced little effect on the reviewers. In the course of the next few years Mill wrote comparatively little, but he "carried on," as he says, "a quantity of thinking respecting a host of subjects." It was a period of search, deliberation, germination, and striking root.

The first sketch of Mill's political philosophy appeared in a series of contributions to the *Examiner* in the autumn of 1830 on "Prospects in France." He was in Paris soon after the July Revolution, made the acquaintance of the leading spirits among the younger men; and in his discussion of what they were doing and what they should do in making a new constitution we find the germs of many thoughts afterward more fully developed in his *Representative Government*.

By 1831 Mill's enthusiasm for humanity had been thoroughly reawakened, and had taken the definite shape of an aspiration to supply an unimpeachable method of search for conclusions in moral and social science. In his *Westminster* review of Whately's *Logic* in 1828 (invaluable to all students of the genesis of Mill's logic) he appears, curiously enough, as an ardent and brilliant champion of the syllogistic logic against highfliers such as the Scotch philosophers who talk of "superseding" it by "a supposed system of inductive logic." His inductive logic must "supplement and not supersede." It must be concatenated with the syllogistic logic, the two to be incorporated in one system. But for several years he searched in vain for the means of concatenation.

Meantime, while recurring again and again, as was his custom, to this cardinal difficulty, Mill worked indefatigably in other directions where he saw his way clear, expatiating over a wide range of political, social, economical, and philosophical questions. He had ceased to write for the *Westminster* in 1828; but during the years 1832 and 1833 he contributed many

essays to *Tait's Magazine*, the *Jurist*, and the *Monthly Repository*. In 1835 the *London Review* was started, with Mill as editor; it was amalgamated with the *Westminster* in 1836, and Mill continued editor till 1840. Much of what he wrote then was subsequently incorporated in his systematic works; some of his essays were reprinted in his first two volumes of *Dissertations and Discussions* (1859).

It was in 1837, on reading Whewell's *Inductive Sciences* and re-reading Herschel, that Mill at last saw his way clear both to formulating the methods of scientific investigation and to joining on the new logic as a supplement to the old.

In the technical history of the science, Mill's *Logic* may be viewed as an attempt to fuse the practical tests of truth set forth in Herschel's *Discourse on Natural Philosophy* with the theoretic views of induction propounded in Whately's *Logic*. But in the history of thought the great importance of the work is due not so much to its endeavor to formulate the methods of science and lay bare the first principles on which they rest as to its systematic application of scientific method to what he called the moral sciences.

The *Logic* was published in 1843. In 1844 appeared his *Essays on Some Unsettled Questions in Political Economy*. These essays were worked out and written many years before, and show Mill in his first stage as a political economist. Four out of the five essays are elaborate and powerful solutions of perplexing technical problems—the distribution of the gains of international commerce, the influence of consumption on production, the definition of productive and unproductive labor, the precise relations between profits and wages.

It would seem that in his fits of despondency one of the thoughts that sat upon him like a nightmare and marred his dreams of human improvement was the apparently inexorable character of economic laws, condemning thousands of laborers to a cramped and miserable existence, and thousands more to semi-starvation. From this oppressive feeling he found relief in the thought set forth in the opening of the second book of his *Political Economy*—that, while the conditions of production have the necessity of physical laws, the distribution of what is produced among the various classes of producers is a matter of human arrangement, dependent upon alterable customs and institutions. There can be little doubt that this thought, whether or not in the clear shape that it afterward assumed, was the germ of all that is most distinctive in his system of political economy. One of his most eminent successors, the late Professor Cairnes, thus admirably summed up his work as a political economist:—"As he himself used to put it, Ricardo supplied the backbone of the science; but it is not less certain that the limbs, the joints, the muscular developments—all that renders political economy a complete and organized body of knowledge—have been the work of Mill."

While his great systematic works were in progress, Mill wrote very little on events or books of the day. He turned aside for a few months from his *Political Economy* during the winter of the Irish famine (1846-47) to advocate the creation of peasant-proprietorships as a remedy for distress and disorder in Ireland. He found time also to write elaborate articles on French history and Greek history in the *Edinburgh Review* apropos of Michelet, Guizot, and Grote, besides some less elaborate essays.

The *Political Economy* was published in 1848. Mill could now feel that the main work he had proposed for himself was accomplished; but, though he wrote comparatively little for some years afterward, he remained as much as ever on the alert for opportunities of useful

influence, and pressed on with hardly diminished enthusiasm in his search for useful truth. Among other things, he made a more thorough study of socialist writers, with the result that, though he was not converted to any of their schemes as being immediately practicable, he began to look upon some more equal distribution of the produce of labor as a practicability of the remote future, and to dwell upon the prospect of such changes in human character as might render a stable society possible without the institution of private property. This he has called his third stage as a political economist, and he says that he was helped toward it by the lady, Mrs. Taylor, who became his wife in 1851, and with whom he had lived in intimate friendship for more than twenty years before.

During the seven years of his married life Mill published less than in any other period of his career, but four of his most closely reasoned and characteristic works, the *Liberty*, the *Utilitarianism*, the *Thoughts on Parliamentary Reform*, and the *Subjection of Women*, besides his posthumously published essays on *Nature* and on the *Utility of Religion*, were thought out and partly written in collaboration with his wife. In 1856 he became head of the examiner's office in the India House, and for two years, till the dissolution of the Company in 1858, his official work, never a light task, kept him fully occupied.

On the dissolution of the Company, Mill was offered a seat in the new council, but declined. His retirement from official work was followed almost immediately by his wife's death, and from this calamity he sought relief in active literary occupation. Politics, sociology, and psychology divided as before the energies of his active mind. One of his first cares was to publish with a touching dedication to his wife the treatise on *Liberty*, which they had wrought out together, principle by principle and sentence by sentence. This pious duty discharged, he turned to current politics, and published a view of the impending Reform Bill, a pamphlet on parliamentary reform. Soon after, Mill supported in *Fraser's*, still with the same object, Mr. Hare's scheme for the representation of minorities. In the autumn of the same year he turned to psychology, reviewing Mr. Bain's works in the *Edinburgh Review*.

In this way the indefatigable thinker worked on, throwing himself by turns into the various lines along which he saw prospects of fulfilling his mission as an apostle of progress. In his *Representative Government* (1860) he systematized opinions already put forward in many casual articles and essays. His *Utilitarianism* was a closely reasoned, systematic attempt to answer objections to his ethical theory and remove misconceptions of it. His treatise on the *Subjection of Women*, in its ruling intention a protest against the abuse of power, was Mill's next work, though it was not published till 1869. His *Examination of Hamilton's Philosophy*, published in 1865, had engaged a large share of his time for three years before.

While mainly occupied in those years with philosophical studies, Mill did not remit his interest in current politics. He made his voice heard on the contest in America in 1862, taking the side of the North—then very unpopular in London—and using all his strength to explain what has since been universally recognized as the issue really at stake in the struggle, the abolition of slavery.

In 1865 a new channel was opened to his influence. He was requested to stand for Westminster, and agreed on conditions strictly in accordance with his principles of parliamentary election. He would not canvass, nor pay agents to canvass for him, nor would he engage to attend to the local business of the constituency. He

was with difficulty persuaded even to address a meeting of the electors. The story of this remarkable election has been told by Mr. James Beal, one of the most active supporters of Mill's candidature. In parliament he adhered to his lifelong principle of doing only work that needed to be done, and that no one else seemed equally able or willing to do. It may have been a consciousness of this fact which prompted a remark made by the Speaker that Mill's presence in parliament elevated the tone of debate. The impression made by him in parliament is in some danger of being forgotten, because he was not instrumental in carrying any great measure that might serve as an abiding memorial.

Mill's subscription to the election expenses of Mr. Bradlaugh and his attitude toward Governor Eyre are generally regarded as the main causes of his defeat in the general election of 1868. He retired with a sense of relief to his cottage and his literary life at Avignon.

No recluse ever had a more soothing retreat than Mill's Avignon cottage, but to the last he did not relax his laborious habits nor his ardent outlook on human affairs. The essays in the fourth volume of his *Dissertations*—on endowments, on land, on labor, on metaphysical and psychological questions—were written for the *Fortnightly Review* at intervals after his short parliamentary career. One of his first tasks was to send his treatise on the *Subjection of Women* through the press. The essay on *Theism* was written soon after. The last public work in which he engaged was the starting of the Land Tenure Reform Association. The interception by the state of the unearned increment, and the promotion of coöperative agriculture, were the most striking features of his programme. He wrote in the *Examiner* and made a public speech in favor of the association a few months before his death. The secret of the ardor with which he took up this question probably was his conviction that a great struggle was impending in Europe between labor and capital. He regarded his project as a timely compromise.

Mill died at Avignon on May 8, 1873.

MILLAU, or MILHAU, capital of an arrondissement in the department of Aveyron, France, is situated on the left bank of the Tarn, half a mile below the point at which that river is joined by the Donrbie, and forty-eight miles to the southeast of Rodez, on the Rodez and Montpellier line. The population in 1881 was 16,628.

MILLEDGEVILLE, a city of Georgia, in Baldwin county, of which it is the capital, lies on the Oconee river. It is a railroad and telegraph center, and was formerly (until 1867) the capital of the State, which afterward was moved to Atlanta. The town has some cotton manufactures, and contains banks, churches, schools, newspaper offices, etc. It has (1890), a population of 3,396.

MILLENNIUM. In the history of Christianity three main forces are found to have acted as auxiliaries of the gospel. They have elicited the ardent enthusiasm of many whom the bare preaching of the gospel would never have made decided converts. These are a belief in the speedy return of Christ and in His glorious reign on earth; mystical contemplation, which regards heavenly blessings as a possible possession in the present life; and faith in a divine predestination of some to salvation and others to perdition.

In the anticipations of the future prevalent among the early Christians (c. 50-150) it is necessary to distinguish a fixed and a fluctuating element. The former includes the notion that a last terrible battle with the enemies of God was impending; the faith in the speedy return of Christ; the conviction that Christ will judge all men, and will set up a kingdom of glory on earth.

To the latter belong views of the Antichrist, of the heathen world power, of the place, extent, and duration of the earthly kingdom of Christ, etc. These remained in a state of solution; they were modified from day to day, partly because of the changing circumstances of the present by which forecasts of the future were regulated, partly because the indications—real or supposed—of the ancient prophets always admitted of new combinations and constructions. But even here certain positions were agreed on in large sections of Christendom. Among these was the expectation that the future kingdom of Christ on earth should have a fixed duration—according to the most prevalent opinion, a duration of one thousand years. From this fact the whole ancient Christian eschatology was known in later times as “chiliasm”—a name which is not strictly accurate, since the doctrine of the millennium was only one feature in its scheme of the future.

This idea that the Messianic kingdom of the future on earth should have a definite duration has—like the whole eschatology of the primitive church—its roots in the Jewish apocalyptic literature, where it appears at a comparatively late period.

Jesus Himself speaks of only one return of the Son of Man—His return to judgment. In speaking of it, and of the glorious kingdom He is to introduce, He makes use of apocalyptic images; but nowhere in the discourses of Jesus is there a hint of a limited duration of the Messianic kingdom. The apostolic epistles are equally free from any trace of chiliasm. In the Apocalypse of John, however, it occurs in the following shape: After Christ has appeared from heaven in the guise of a warrior, and vanquished the antichristian world-power, the wisdom of the world, and the devil, those who have remained steadfast in the time of the last catastrophe, and have given up their lives for their faith, shall be raised up, and shall reign with Christ on this earth as a royal priesthood for one thousand years. At the end of this time Satan is to be let loose again for a short season; he will prepare a new onslaught, but God will miraculously destroy him and his hosts. Then will follow the general resurrection of the dead, the last judgment, and the creation of new heavens and a new earth. That *all* believers will have a share in the first resurrection and in the Messianic kingdom is an idea of which John knows nothing. The earthly kingdom of Christ is reserved for those who have endured the most terrible tribulation, who have withstood the supreme effort of the world-power—that is, for those who are actually members of the church of the last days. More than this John does not say. But other ancient Christian authors were not so cautious. Accepting the Jewish apocalypses as sacred books of venerable antiquity, they read them eagerly, and transferred their contents bodily to Christianity. Nay, more, the Gentile Christians took possession of them, and just in proportion as they were neglected by the Jews—who, after the war of Bar-Cochba, became indifferent to the Messianic hope and hardened themselves once more in devotion to the law—they were naturalized in the Christian communities. The result was that these books became “Christian” documents; it is entirely to Christian, not to Jewish, tradition that we owe their preservation, and with them the idea of the millennium.

MILLER, HUGH, eminent in science and literature, and one of the most remarkable among self-taught men of genius, was born at Cromarty, on the northeast coast of Scotland, on October 10, 1802. The enchantment of open air and freedom—the irresistible charm of mother nature on the hill and by the sea—made him at thirteen an incorrigible truant; and his schoolmaster thought it likely that he would prove a dunce. Never-

theless the truant schoolboy was already giving indications of the destination of the man. At an age too early to date he had found in his pen a divining rod that led him to waters of inexhaustible delight. His mother summed up, in the singular dialect of the district, the impression derived from her son's boyhood and youth in the words, “he was aye vritin.”

It is a curious fact that what determined Hugh Miller to apprentice himself to a stone-mason was his delight in literary composition. Unemployed during the winter frosts, the mason, he perceived, could enjoy for some months every year the ecstasy of writing. One result of his decision was that he never learned any language but English. Another was that fifteen years of the quarry and the hewing-shed, with stern experiences of over-work and privation, sowed in his frame the seeds of incurable disease. Meanwhile the advantages of his decision were indisputable. Under the discipline of labor the refractory schoolboy became a thoughtful, sober-minded man. Miller always looked back to his years of hand-labor with a satisfaction that has something in it of solemnity and pathos.

Returning to Cromarty, he worked in happy patience as a stone-cutter year after year, sedulously prosecuting at the same time the grand object of his ambition, to write good English. He found time to invigorate and enrich his mind by careful reading, and was habitually and keenly observant both of man and of nature. His reading was not extensive but well chosen. In 1829 appeared the small volume containing *Poems Written in the Leisure Hours of a Journeyman Mason*. It procured its author the valuable friendship of Mr. Robert Carruthers, and was favorably noticed by the press. Miller looked at his poems in print, and concluded, at once and irreversibly, that he would not succeed as a poet. It was a characteristic and very manly decision, proving that there was no fretting vanity in his disposition. Doubtless also it was right. His field was prose. But, though his poems yielded nothing in the way of fortune, they were a beginning of fame. Good judges in Edinburgh detected in his work the mint-mark of genius, and Miller's first prose volume, *Scenes and Legends of Cromarty*, was published there in 1835.

He was a married man, and his tent seemed stably fixed at Cromarty, when the agitation that preceded the Disruption of 1843 made the air of Scotland vibrate. Miller loved his church, and deliberately esteemed her the most valuable institution possessed by the Scottish people. Fervently as he had sympathized with those who procured political representation for Scotland by the Reform Bill, he still more fervently took part with those who claimed that Scottish congregations should have no pastors thrust upon them. In the summer of 1839 he wrote his famous pamphlet-letter to Lord Brougham; Doctor Candlish read it with “nothing short of rapture;” and the first days of 1840 saw Miller installed in the editorial chair of the *Witness* newspaper, published twice a week in Edinburgh to advocate the cause of non-intrusion and spiritual independence. He continued to edit the *Witness* till his death, which took place in the night between December 23 and 24, 1856. Unremitting brain work had overtaxed a system permanently injured by the hardships of his early mason life; reason at length gave way, and Miller died by a pistol shot fired by his own hand. A *post-mortem* examination, attested by four medical men of the highest character, evinced the presence of “diseased appearances” in the brain; and he left a few words indicating the form taken by the insane delusion which had mastered him.

When, however, he had convinced himself that his

road to the stars was not by poetry, and when the limited success of his prose tales and literary essays in the volume on Cromarty suggested a profound misgiving as to the adequacy of his purely literary materials to produce an important result, he bethought him of his hoard of scientific knowledge, and addressed himself with the concentrated energy of mature manhood to geological reading and geological researches. The principal scene of his own investigations was the Cromarty district, where he ransacked every wrinkle of the hill-side, and traced every stratum sawn through by the watercourse, and where, on the beach at ebb, in indurated clay of bluish tint and great tenacity, belonging to the Old Red Sandstone formation, he discovered and dug out nodules which, when laid open by a skillful blow of the hammer, displayed certain organisms that had never been seen by a human eye. He had entered upon correspondence with Murchison and Agassiz; and "fellows of the Geological Society and professors of colleges" had been brought by his descriptions "to explore the rocks of Cromarty." So early as September, 1840, there began to appear in the *Witness* a series of articles entitled "The Old Red Sandstone." They attracted immediate and eager attention. The articles which met with so enthusiastic a reception from the most eminent geologists in Europe formed the nucleus of a book soon after published, and entitled *The Old Red Sandstone*. He had at last fairly found his hand. Afterward followed his principal geological books, *The Footsteps of the Creator*, and *The Testimony of the Rocks*.

MILLER, WILLIAM, the founder of an American religious sect holding peculiar millennial views, was born at Pittsfield, Massachusetts, in 1781, and died in 1849. About 1843 the second coming of Christ was expected by as many as 50,000 believers in the doctrines of Miller; and, although the disappointment of their hopes somewhat diminished their numbers, many continued their adherence to his tenets regarding the nature of the millennium. At present the number of Millerites or Adventists is estimated at from 15,000 to 20,000.

MILLER, WILLIAM, one of the greatest of modern line-engravers, was born in Edinburgh May 28, 1796, and died in 1882.

MILLER'S THUMB (*Cottus gobio*), a well-known little fish, abundant in all rivers and lakes of northern and central Europe with clear water and gravelly bottom. The genus *Cottus*, to which the Miller's Thumb belongs, is easily recognized by its broad, flat head, rounded and scaleless body, large pectoral and narrow ventral fins, with two dorsal fins, the anterior shorter than the posterior; the præoperculum is armed with a simple or branched spine. The species of the genus *Cottus* are rather numerous, and are confined to the north temperate zone of the globe, the majority being marine, and known by the name of "bullheads."

MILLET is a name applied with little definiteness to a considerable number of often very variable species of cereals belonging to distinct genera and even subfamilies of *Gramineæ*. The true millet, however, is generally admitted to be *Panicum (Setaria) miliaceum*, L. It is indigenous to the East Indies and North Australia, but is mentioned by Hippocrates and Theophrastus as already cultivated in South Europe in their time. Some suppose it to be one of the earliest grains used in bread-making, and ascribe the origin of its name to *panis*, bread, rather than to the paniculate inflorescence. It is annual, requires rich but friable soil, grows to about three or four feet high, and is characterized by its bristly, much branched nodding panicles. One variety has black grains. It is largely cultivated in India, southern Europe, and northern Africa, and ripens as

far north as southern Germany, in fact, wherever the climate admits of the production of wine. The grain, which is very nutritious, is used in the form of groats, and makes excellent bread when mixed with wheaten flour. It is also largely used for feeding poultry and cage-birds, for which purpose mainly it is imported.

But the most important dry grain of the tropical countries of Africa and Asia, particularly of India, is *Sorghum vulgare*, great millet, indian millet, turkish millet, or guinea corn. It ranges probably as extensively as wheat, being also largely cultivated in southern Europe, the United States, and the West Indies. In Asia Minor, Arabia, Italy, and Spain it may be said to replace oats and barley. It is annual, and may reach twelve feet in height; it is extremely prolific, even rivaling maize, of which it is a near congener. Its flour is very white, but does not easily make good bread; it is largely used in cakes and puddings and for feeding cattle and poultry. The panicles are used for brooms, and the roots for velvet-brushes.

MILLET, JEAN FRANÇOIS, was a painter of French peasant life, and it may be questioned whether France has produced in our day any greater or more original artist. He himself came of a peasant family, and was born on October 4, 1814, in the hamlet of Gruchy, near Gréville (La Manche), in the wild and picturesque district called La Hague. On January 20, 1875, he died. He was buried in the churchyard of Chailly, by the side of his friend Rousseau.

MILL SPRINGS, a village in Wayne county, Ky., on the Cumberland river, about eighty miles south of Lexington, is famous as the scene of a battle between the Union and Confederate forces, which occurred on January 19, 1862. Gen. George H. Thomas commanded the Federal troops and inflicted a severe defeat upon the Confederates, who were under the command of Gen. George B. Crittenden.

MILMAN, HENRY HART, dean of St. Paul's, was born February 10, 1791. In 1816 he was ordained, and was soon afterward presented to the living of St. Mary's, Reading. He had already made his appearance as a dramatic writer, his tragedy of *Fazio*, founded on a narrative in the *Annual Register* for 1795, having been brought on the stage without his knowledge under the title of *The Italian Wife*. The death struggle of an expiring nation in the *Fall of Jerusalem* (1820), the conflict of new truth and old order, of religious enthusiasm and earthly affection, in the *Martyr of Antioch* (1822), are depicted with great eloquence and real insight into human nature. *Belshazzar* (1822) is in general a pale copy of Byron's *Sardanapalus*. His tragedy of *Anne Boleyn* (1826) is a poor performance. With the exception of admirable versions of the Sanskrit episode of Nala and Damayanti, and of the *Agamemnon* and *Bacchæ*, this was Milman's last poetical work. In 1830 his *History of the Jews* appeared in the Family Library. His *History of Christianity under the Empire* had appeared in 1840, but had been completely ignored. Widely different was the reception of the continuation, his great *History of Latin Christianity* to the death of Pope Nicholas V., which appeared in 1855. He also edited Gibbon and Horace, and at his death in 1868 left behind him almost finished a delightful history of his own cathedral, which was completed and published by his son.

MILO, one of the most famous athletes of Greece, whose name became proverbial for personal strength, lived about the end of the sixth century B.C. The traditional account of his death is often used to point a moral: he found a tree which some woodcutters had partly split with a wedge, and attempted to rend it asunder; but the wedge fell out, and the tree closed on

his hand, imprisoning him till wolves came and devoured him.

MILLO was the surname of T. Annius Papianus, one of the best-known of the partisan leaders and ruffians in the stormy times that preceded the dissolution of the Roman republic. P. Clodius, the leader of the ruffians who professed the democratic cause, was his personal enemy, and their brawls in the streets and their mutual accusations in the law courts lasted for several years, beginning when Milo was tribune of the commons in 57 B.C. Milo joined the insurrection of M. Caelius in 48 B.C., and was soon slain near Thurii in Lucania. His wife Fausta was daughter of the dictator Sulla.

MILTIADES. See GREECE.

MILTON, JOHN, was born in Bread street, Cheapside, London, on December 9, 1608. Again and again Milton speaks with gratitude and affection of the ungrudging pains bestowed by his father on his early education. This brings us to about the year 1619, when Milton was ten years of age. At that time his domestic tutor was Thomas Young, a Scotsman from Perthshire, and graduate of the university of St. Andrews, afterward a man of no small distinction among the English Puritan clergy, but then only curate or assistant to some parish clergyman in or near London, and eking out his livelihood by private teaching.

On February 12, 1624-25, Milton, at the age of sixteen years and two months, was entered as a student of Christ's College, Cambridge, in the grade of a "Lesser Pensioner." His matriculation entry in the books of the university is two months later, April 9, 1625. Between these two dates James I. had died, and had been succeeded by Charles I.

Milton's academic course lasted seven years and five months, or from February, 1624-25, to July, 1632, bringing him from his seventeenth year to his twenty-fourth. The first four years were his time of undergraduateship. In July, 1632, Milton completed his career at the university by taking his M. A. degree.

Of Milton's skill at Cambridge in what Wood calls "the collegiate and academical exercises" specimens remain in his *Prologiones Quædam Oratoriæ*. They consist of seven rhetorical Latin essays, generally in a whimsical vein, delivered by him, in his undergraduateship or during his subsequent bachelorship in arts, either in the hall of Christ's College or in the public University School. Relics of Milton's Cambridge period are also four of his Latin *Familiar Epistles*; but more important are the poetical remains. These include the greater number of his preserved Latin poems—to wit, (1) the seven pieces which compose his *Elegiarum Liber*, two of the most interesting of them addressed to his medical friend, Charles Diodati, and one to his former tutor Young in his exile at Hamburg, (2) the five short Gunpowder Plot epigrams, now appended to the *Elegies*, and (3) the first five pieces of the *Sylvarum Liber*, the most important of which are the hexameter poem *In Quintum Novembris* and the piece entitled *Naturam non pati senium*. Of the English poems of the Cambridge period the following is a dated list:—*On the Death of a Fair Infant*, 1625-26, the subject being the death in that inclement winter of his infant niece, the first-born child of his sister, Mrs. Phillips; *At a Vacation Exercise in the College*, 1628; the magnificent Christmas ode *On the Morning of Christ's Nativity*, 1629; the fragment called *The Passion* and the *Song on May Morning*, both probably belonging to 1630; the lines *On Shakespeare*, certainly belonging to that year; the two facetious pieces *On the University Carrier*, 1630-31; the *Epitaph on the Marchioness of Winchester*, 1631; the sonnet *To the Nightingale*, probably of the same year; the sonnet

On arriving at the Age of twenty-three, dating itself certainly in December, 1631.

Just before Milton quitted Cambridge, his father, then verging on his seventieth year, had practically retired from his Bread street business, leaving the active management of it to a partner, named Thomas Bower, a former apprentice of his, and had gone to spend his declining years at Horton in Buckinghamshire, a small village near Colnbrook, and not far from Windsor. Here, accordingly, in a house close to Horton church, Milton mainly resided for the next six years—from July, 1632, to April, 1638.

It is an interesting fact that Milton's very first public appearance in the world of English authorship was in so honorable a place as the second folio edition of *Shakespeare* in 1632. Among the poems actually written by Milton at Horton the first, in all probability, after the Latin hexameters *Ad Patrem*, were the exquisite companion pieces *L'Allegro* and *Il Penseroso*. There followed, in or about 1633, the fragment called *Arcades*. Next in order among the compositions at Horton may be mentioned the three short pieces, *At a Solemn Music*, *On Time*, and *Upon the Circumcision*; after which comes *Comus*, the largest and most important of all Milton's minor poems. From September, 1634, to the beginning of 1637 is a comparative blank in our records. The year 1637 was eventful in his biography. It was in that year that his *Comus*, after lying in manuscript for more than two years, was published by itself, in the form of a small quarto of thirty-five pages. The author's name was withheld, and the entire responsibility of the publication was assumed by Henry Lawes. In November, 1637, and probably at Horton, whence the plague had by that time vanished, he wrote his matchless pastoral monody of *Lycidas*. It was early in 1638, when Milton was in his thirtieth year, that copies of his *Lycidas* may have been in circulation among those who had already become acquainted with his *Comus*.

Milton was then on the wing for a foreign tour. He had long set his heart on a visit to Italy, and circumstances now favored his wish. Before the end of April, 1638, he was on his way across the Channel, taking one English man-servant with him. He was home again in August, 1639, having been absent in all fifteen or sixteen months. Milton's continental tour, and especially the Italian portion of it, remained one of the chief pleasures of his memory through all his subsequent life. Nor was it quite without fruits of a literary kind. Besides two of his Latin *Epistolæ Familiæres*, one to the Florentine grammarian Buommattei, and the other to Lucas Holstenius, there have to be assigned to Milton's sixteen months on the continent his three Latin epigrams *Ad Leonoram Romæ Canentem*, his Latin seasons *Ad Salsillum Poetam Romanum Ægrotantem*, his fine and valuable poem, in Latin hexameters, entitled *Mansus*, and his *Five Italian sonnets, with a Canzone*, celebrating the charms of some Italian lady he had met in his travels.

One sad and marring memory did mingle itself with all that was otherwise so delightful in his Italian reminiscences. His bosom friend and companion from boyhood, the half-Italian, Charles Diodati, who had been to him as Jonathan to David, and into whose ear he had hoped to pour the whole narrative of what he had seen and done abroad, had died during his absence. How profoundly this affected him appears from his *Epitaphium Damonis*, then written in memory of his dead friend. The importance of this poem in Milton's biography cannot be overrated. It is perhaps the noblest of all his Latin poems; and, though in the form of a pastoral, and even of a pastoral of the most artificial

sort, it is unmistakably an outburst of the most passionate personal grief.

Not long after Milton's return the house at Horton ceased to be the family home. Christopher Milton and his wife went to reside at Reading, taking the old gentleman with them, while Milton himself preferred London. He had first taken lodgings in St. Bride's Churchyard, at the foot of Fleet street; but, after awhile, probably early in 1640, he removed to a "pretty garden house" of his own, at the end of an entry, in the part of Aldersgate street which lies immediately on the city side of what is now Maidenhead court. His sister, whose first husband had died in 1631, had married a Mr. Thomas Agar, his successor in the Crown Office; and it was arranged that her two sons by her first husband should be educated by their uncle. John Phillips, the younger of them, only nine years old, had boarded with him in the St. Bride's Churchyard lodgings; and, after the removal to Aldersgate street, the other brother, Edward Phillips, only a year older, became his boarder also. Gradually a few other boys, the sons of well-to-do personal friends, joined the two Phillipses, whether as boarders or for daily lessons, so that the house in Aldersgate street became a small private school. The drudgery of teaching seems always to have been liked by Milton. A list in his own handwriting among the Milton MSS. at Cambridge, shows what subject for poetical treatment he was contemplating at that time. It contains jottings of no fewer than fifty-three subjects from the Old Testament, eight from the Gospels, thirty-three from British and English history before the Conquest, and five from Scottish history. It is interesting to observe which of the subjects fascinated Milton most. Though some of them are sketched pretty fully, not one is sketched at such length and so particularly as *Paradise Lost*. It is the first subject on the list, and there are four separate drafts of a possible tragedy under that title, two of them merely enumerating the *dramatis personæ*, but the last two indicating the plot and the division into acts. Thus, in 1640, twenty-seven years before *Paradise Lost* was given to the world, he had put down the name on paper, and had committed himself to the theme.

The controversies of the two parties, royalists and roundheads, together with the peculiar attitude of the ecclesiastical authorities called from Milton's pen several tracts, among them being one on the *Reformation Touching Church Discipline*, and another *The Reason of Church Government*. Numerous other productions from his pen mark this period. The greatest of the four, and the most important of all Milton's anti-Episcopal pamphlets after the first, is that entitled *The Reason of Church Government*.

In 1643 he married Mary Powell. Hardly were the honeymoon festivities over in Aldersgate street when, her sister and other relatives having returned home and left her alone with her husband, she pined for home again and begged to be allowed to go back on a visit. Milton consented, on the understanding that the visit was to be a brief one. This seems to have been in July, 1643. Soon, however, the intimation from Forest Hill was that he need not look ever to have his wife in his house again.

Milton's conduct under the insult of his wife's desertion was most characteristic. Always fearless and speculative, he converted his own case into a public protest against the existing law and theory of marriage. *The Doctrine and Discipline of Divorce Restored, to the good of both Sexes*, was the title of a pamphlet put forth by him in August, 1643, without his name, but with no effort at concealment, declaring the notion of a sac-

ramental sanctity in the marriage relation to be a clerically invented superstition, and arguing that inherent incompatibility of character, or contrariety of mind, between two married persons, is a perfectly just reason for divorce. For this he narrowly escaped prosecution.

Among the questions in agitation in the general ferment of opinion brought about by the civil war was that of a reform of the national system of education and especially of the universities. To this question Milton made a contribution in June, 1644, in a small *Tract on Education*. In the very next month, however, July, 1644, he returned to the divorce subject in a pamphlet addressed specially to the clergy and entitled *The Judgment of Martin Bucer Concerning Divorce*. Strenuous efforts were made to bring him within definite parliamentary censure, and the matter came before committee both in the House and in the Lords. It is to this circumstance that the world owes the most popular and eloquent, if not the greatest, of all Milton's prose-writings, his famous *Areopagitica, a Speech of Mr. John Milton for the Liberty of Unlicensed Printing to the Parliament of England*. It appeared in the end of November, 1644, deliberately unlicensed and unregistered, as was proper on such an occasion, and was a remonstrance addressed to the parliament. To this period there belong, in the shape of verse, only his sonnets ix. and x., the first to some anonymous lady, and the second "to the Lady Margaret Ley." His divorce speculation, however, still occupied him; and in March, 1644-45 he published simultaneously his *Tetrachordon, or Expositions upon the four chief places of Scripture which treat of Marriage*, and his *Colasterion, a Reply to a nameless Answer against the Doctrine and Discipline of Divorce*. In these he replied to his chief recent assailants, lay and clerical, with merciless severity.

So far as Milton was concerned personally, his interest in the divorce speculation came to an end in July or August, 1645, when, by friendly interference, a reconciliation was effected between him and his wife. The ruin of the king's cause at Naseby had suggested to the Powells that it might be as well for their daughter to go back to her husband after their two years of separation. It was not, however, in the house in Aldersgate street that she rejoined him, but in a larger house, which he had taken in the adjacent street called Barbican, for the accomodation of an increasing number of pupils.

The house in Barbican was tenanted by Milton from about August, 1645, to September or October, 1647. Among his first occupations there must have been the revision of the proof sheets of the first edition of his collected poems. It appeared as a tiny volume, copies of which are now very rare, with the title *Poems of Mr. John Milton, both English and Latin, composed at several times*. The title page gives the date 1645, but January, 1645-46 seems to have been the exact month of the publication.

The first Englishman of mark out of parliament to attach himself openly to the new republic after the execution of Charles was John Milton. This he did by the publication of his pamphlet entitled *Tenure of Kings and Magistrates, proving that it is lawful, and hath been held so in all ages, for any who have the power, to call to account a Tyrant or wicked King, and, after due conviction, to depose and put him to death, if the ordinary Magistrate have neglected to do it*. It was out within a fortnight after the king's death, and was Milton's last performance in the house of High Holborn. The chiefs of the new republic could not but perceive the importance of securing the services of a man who had so opportunely and so powerfully spoken out in favor of their tremendous act, and who

was otherwise so distinguished. In March, 1648-49, accordingly, Milton was offered, and accepted, the secretaryship for foreign tongues to the council of state of the new Commonwealth.

At the date of Milton's appointment to the secretaryship he was forty years of age. His special duty was the drafting of such letters as were sent by the council of state, or sometimes by the Rump Parliament, to foreign states and princes, with the examination and translation of letters in reply, and with personal conferences, when necessary, with the agents of foreign powers in London, and with envoys and ambassadors. Hence from the first, his employment in very miscellaneous work. He was employed in the examination of suspected papers, and in interviews with their authors and printers; and he executed several great literary commissions expressly intrusted to him by the council. The first of these was his pamphlet entitled *Observations on Ormond's Articles of Peace with the Irish Rebels*. More important still was the *Eikonoklastes* (which may be translated "Image-Smasher"), published by Milton in October, 1649, by way of counterblast to the famous *Eikon Basilike* ("Royal Image"), which had been in circulation in thousands of copies since the king's death, and had become a kind of Bible in all royalist households, on the supposition that it had been written by the royal martyr himself. A third piece of work was of a more laborious nature. In the end of 1649 there appeared abroad, under the title of *Defensio Regia pro Carolo I.*, a Latin vindication of the memory of Charles, with an attack on the English Commonwealth, intended for circulation on the Continent. To answer it was thought a task worthy of Milton. Milton's Latin *Pro Populo Anglicano Defensio*, as it was called, ran at once over the British Islands and the Continent, rousing acclamation everywhere, and received by scholars as an annihilation of the great Salmasius.

About the end of 1651 Milton left his official rooms in Whitehall for a house he had taken on the edge of St. James' Park, in what was then called Petty France, Westminster, but is now York street. The house existed till 1880, but has been pulled down. He had now more to do in the special work of his office, in consequence of the increase of correspondence with foreign powers. But he had for some time been in ailing health; and a dimness of eyesight which had been growing upon him gradually for ten years had been settling rapidly, since his labor over the answer to Salmasius, into total blindness. Actually, before or about May, 1652, when he was but in his forty-fourth year, his blindness was total, and he could go about only with some one to lead him. He recovered sufficiently to resume his secretarial duties, and the total number of his dictated state letters for the single year 1652 is equal to that of all the state letters of his preceding term of secretaryship put together.

On April 20, 1653, there was Cromwell's great act of armed interference by which he turned out the small remnant of the Rump Parliament, dismissed their council of state, and assumed the government of England, Ireland, and Scotland into his own hands. Milton, whose boundless admiration of Cromwell had shown itself already in his Irish tract of 1649 and in his recent sonnet, was recognized as one of the Oliverians. He remained in Oliver's service and was his Latin secretary through the whole of the Protectorate.

Milton married a second time in 1656, his wife dying fifteen months later leaving no children.

Cromwell's death on September 3, 1658, left the Protectorship to his son Richard. Milton and Marvell continued in their posts, and a number of the Foreign Office letters of the new Protectorate were of Milton's

composition. Thinking the time fit, he also put forth, in October 1658, a new edition of his *Defensio Prima*, and, early in 1659, a new English pamphlet, entitled *Treatise of Civil Power in Ecclesiastical Causes*, ventilating those notions of his as to the separation of church and state which he had been obliged of late to keep to himself. To Richard's Protectorate also belongs one of Milton's Latin *Familiar Epistles*. Meanwhile, though all had seemed quiet round Richard at first, the jealousies of the army officers left about him by Oliver, and the conflict of political elements let loose by Oliver's death, were preparing his downfall. In May, 1659, Richard's Protectorate was at an end. On April 25th, the Convention Parliament met; on May 1st, they resolved unanimously that the government by King, Lords, and Commons should be restored; and on May 29, 1660, Charles II. made his triumphal entry into London. The chief republicans had by that time scattered themselves, and Milton was in hiding in an obscure part of the city.

How Milton escaped the scaffold at the Restoration is a mystery now, and was a mystery at the time. Actually, in the terrible course through the two Houses of the Convention Parliament of that Bill of Indemnity by which the fates of the surviving regicides and of so many others of the chief republican culprits were determined, Milton was named for special punishment. It was voted by the Commons that he should be taken into custody by the sergeant-at-arms, for prosecution by the attorney-general on account of his *Eikonoklastes* and *Defensio Prima*, and that all copies of those books should be called in and burnt by the hangman. There was, however, some powerful combination of friendly influences in his favor, with Monk probably abetting. At all events, on August 29, 1660, when the Indemnity Bill did come out complete, with the king's assent, granting full pardon to all for their past offenses, with the exception of about a hundred persons named in the bill itself for various degrees of punishment, thirty-four of them for death and twenty-six for the highest penalty short of death, Milton did not appear as one of the exceptions on any ground or in any of the grades. From that moment, therefore, he could emerge from his hiding, and go about as a free man.

Milton did not return to Petty France. For the first months after he was free he lived as closely as possible in a house near what is now Red Lion square, Holborn. Thence he removed, apparently early in 1661, to a house in Jewin street, in his old Aldersgate-street and Barbican neighborhood.

In Jewin street Milton remained for two or three years, or from 1661 to 1664.

During this time he contracted his (third) marriage with Elizabeth Minshull, of a good Cheshire family, and a relative of Doctor Paget's. They were married on February 24, 1662-63, the wife being then only in her twenty-fifth year, while Milton was in his fifty-fifth. She proved an excellent wife; and the Jewin street household, though the daughters remained in it, must have been under better management from the time of her entry into it. From that date Milton's circumstances must have been more comfortable, and his thoughts about himself less abject, than they had been through the two preceding years. All the while of his seeming degradation he had found some solace in renewed industry of various kinds among his books and tasks of scholarship, and all the while, more particularly, he had been building up his *Paradise Lost*. He had begun the poem in earnest, we are told, in his house in Petty France, in the last year of Cromwell's Protectorate, and then not in the dramatic form contemplated eighteen years before, but deliberately in the epic form.

He had made but little way when there came the interruption of the anarchy preceeding the Restoration and of the Restoration itself; but the work had been resumed in Jewin street and prosecuted there steadily, by dictations of twenty or thirty lines at a time to whatever friendly or hired amanuensis chanced to be at hand. Considerable progress had been made in this way before his third marriage; and after that the work proceeded apace, his nephew, Edward Phillips, who was then out in the world on his own account, looking in when he could to revise the growing manuscript.

It was not in the house in Jewin street, however, that *Paradise Lost* was finished. Not very long after the third marriage, probably in 1664, there was a removal to another house, with a garden, not far from Jewin street, but in a more private portion of the same suburb. This, which was to be the last of all Milton's London residences, was in the part of the present Bunhill row which faces the houses that conceal the London artillery ground and was then known as "Artillery Walk, leading to Bunhill Fields." Here the poem was certainly finished before July, 1665. Why the poem was not published immediately does not distinctly appear, but may be explained partly by the fact that the official licenser hesitated before granting the necessary *imprimatur* to a book by a man of such notorious republican antecedents, and partly by the paralysis of all business in London by the Great Fire of September, 1666. It was not till April 27, 1667, that Milton concluded an agreement with a publisher for the printing of his epic. By the agreement of that date, still extant, Milton sold to Samuel Simmons, printer, of Aldersgate street, London; for \$25 down, the promise of another \$25 after the sale of a first edition of thirteen hundred copies, and the further promise of two additional sums of \$25 each after the sale of two more editions of the same size respectively, all his copyright and commercial interest in *Paradise Lost* for ever. It was as if an author now were to part with all his rights in a volume for \$87 down, and a contingency of \$262 more in three equal installments. The poem was duly entered by Simmons as ready for publication in the Stationers' Register on the 20th of the following August; and shortly after that date it was out in London as a neatly printed small quarto, with the title *Paradise Lost: A Poem written in Ten Books: By John Milton*. The publishing price was 3s., equal to about \$2.62 now. It is worth noting as an historical coincidence that the poem appeared just at the time of the fall and disgrace of Clarendon.

The remaining years of Milton's life, extending through that part of the reign of Charles II. which figures in English history under the name of "The Cabal Administration," were by no means unproductive. His literary activity only ceased with his life. On November 8, 1674, being a Sunday, Milton died, in his house in Bunhill, of "gout struck in," or gout-fever, at the age of sixty-five years and eleven months. He was buried, the next Thursday, in the church of St. Giles, Cripplegate, beside his father, a considerable concourse attending the funeral.

MILTON, a Pennsylvania town in Northumberland county, lies on the west branch of the Susquehanna river. It has railroad and telegraph connections, several iron-works and lumber working establishments, and banks, churches, schools, etc. A newspaper is published here. Population (1890), 6,000.

MILLVILLE, a town of New Jersey, in Cumberland county. The town has railroad and telegraph connections, and contains several glass and other manufacturing industries, together with banks, churches, schools, etc. Several newspapers are published here, and the town has (1890) a population of 10,002.

MILWAUKEE, the largest city in the State of Wisconsin, is situated on the west shore of Lake Michigan, 100 miles north of its southern end, and eighty miles north of Chicago, and 1,000 miles northwest of New York by rail. The shore of the lake is 600 feet above the level of the sea.

The Milwaukee and Menomonee rivers unite in the center of the business portion of the city, about half a mile from their entrance to Lake Michigan, where they are joined by a third and smaller stream—the Kinnikinnic. A bay 6 miles from cape to cape, and 3 miles broad, stretches in front of the city, which commands a fine water view, the ground rising along the shore 80 feet above the level of the lake, then gradually sloping westward to the Milwaukee river, and again rising on the west and north to a height of 125 feet. The ground also rises to a commanding elevation south of the valley of the Menomonee. Few cities present so many natural attractions of site, as indeed its Indian name indicates ("the beautiful hollow or bay"); and art has added to nature. In the residence parts of the city there are miles of avenues from 70 to 100 feet wide, lined on both sides with elms and maples, behind which stand handsome houses with spacious lawns, fountains, and evergreens, giving the appearance of a continuous park. The material used for building is largely the cream-colored brick made in the vicinity, from which Milwaukee is sometimes called the "Cream City." The climate, tempered by the great lake, is remarkably pleasant and healthy. The mean temperature, as shown by the records of twenty years, is 46.7° Fahr. The coldest month is January (average 22.37°), the hottest July (70.4°). During the last few years the average death-rate has been but 20 per 1,000, showing it to be one of the healthiest of American cities. Besides a full complement of the usual religious and charitable institutions, there is adjoining the city the national home for disabled United States volunteer soldiers, consisting of several buildings situated in grounds of 400 acres extent, which serve the purpose of a city park. There are numerous lodges belonging to the freemasons and other societies; and the Turners' societies, which embrace a large membership and own some valuable buildings, have done much to create and keep up the practice of athletic exercises among the citizens. Two excellent musical societies are also established here.

Before the year 1835 Milwaukee was known only as an Indian trading-post occupied by a Frenchman named Solomon Juneau, who is generally spoken of as the founder of the city. The total inhabitants in 1838 numbered only 700; in 1840 there were 1,712; but in 1846 the population amounted to 9,666, in 1850 to 20,061, in 1855 to 30,118, in 1860 to 45,246, in 1870 to 71,440, and in 1880 to 115,578 (57,475 males and 58,103 females). In 1890 the population had increased to 204,463, more than one-half of them of foreign parentage, a very large majority being Germans. Notwithstanding the multitude of nationalities represented in the population, there are few cities more orderly and law-abiding, the number of police employed being less than one for every 1,500 inhabitants. Another feature worthy of mention is the large proportion of families who own their own houses, and this is true not only as to the mercantile and professional classes, but especially as to the laboring population. Although the grain trade, formerly very large here, has now greatly diminished, the growth and prosperity of the city have not materially suffered, owing to the development of manufacturing industries, for which the low rents, healthy climate, and advantageous location make it well adapted. A large portion of the population are engaged in the manufacture of clothing, cigars, cooperage, leather,

bricks, sashes, doors, and blinds, machinery and flour (of which 1,000,000 barrels are made annually), and in meat-packing. Milwaukee has become famous for its lager beer, of which there are over 1,000,000 barrels annually produced, valued at \$10,400,000 (figures of 1889). The value of brewery interests is estimated at about \$36,000,000. The lake commerce is very large, the tonnage entered and cleared being about as large as that of Baltimore, Boston, or Philadelphia. The Wisconsin Central, the Milwaukee & Lake Shore, the Milwaukee & Northern, and the Chicago, Milwaukee & St. Paul railways have their head offices here, and the last named, owning over 4,000 miles of lines, has immense workshops in the Menominee valley near the city.

Milwaukee is governed by a mayor and a common council. The streets and public buildings are under the charge of the board of public works, composed of commissioners and the city engineer, all subject to the common council. A bountiful supply of water is obtained from the lake, and the streets are well supplied with sewers. The value of property as assessed for taxation was \$100,498,200 in 1889—the city debt being \$2,920,000, mostly for the water-works, which are city property. Expenditures for 1889, \$7,807,886.

There is an efficient system of public schools, under a superintendent and board of school commissioners, the value of the buildings with their sites being estimated at over \$700,000. For the higher education there are a high school, a normal school, and three commercial colleges, while the Roman Catholics and Lutherans have several excellent denominational seminaries and colleges. A public library belongs to the city. The city has an efficient police force of 181 members, and a fire department of twelve steamers, eleven hose carriages, five hook and ladder trucks, one fire boat, four chemical engines, and 164 men.

The mayor's message for 1889 shows that 22 miles of streets and alleys were improved during the year at an expense of \$338,000. The area of the city equals 10,734 acres, or 16 77-100 square miles; the entire length of streets paved is 30½ miles; of streets otherwise improved, 170 miles; of sewers, exclusive of the large Menomonee special sewer, 147 miles; and of water mains, 147½ miles.

MIMICRY is the name given in biology to the advantageous resemblance (usually protective) which one species of animal or plant often shows to another. The word was first applied in this metaphorical sense by Mr. W. H. Bates, and it has since been accurately defined and limited, in its biological application. Briefly put, the essence of the phenomenon of mimicry consists in the following relation. A certain species of plant or animal possesses some special means of defense from its enemies, such as a sting, a powerful and disagreeable odor, a nauseous taste, or a hard integument. Some other species inhabiting the same district or a part of it, and not itself provided with the same special means of defense, closely resembles the first species in all external points of form and color, though often very different in structure and unrelated in the biological order.

The theoretical explanation of mimicry on evolutionary principles may best be considered in connection with the general subject of protective coloration and variation in form, of which it is a very special case. There are two ways in which imitative coloring may benefit a species. It may help the members of the species to escape the notice of enemies, or it may help them to deceive prey. In the first case imitative hues enable the animal or plant to avoid being itself devoured; in the second case they enable it to devour others more easily,

and so to secure a larger amount of food than less deceptively colored compeers. In the former instance we must suppose that such individuals as did not possess the deceptive coloring have been discovered and destroyed by enemies with a highly developed sight, while those which possessed it have survived. In the latter instance we must suppose that the individuals which have no protective coloring have failed to secure sufficient prey, through too readily betraying their presence, and that only those which possessed such coloring have become the parents of future generations. It is difficult however, to separate these two cases, and in many instances the same coloring may aid a species both in escaping its peculiar enemies and in deceiving its peculiar prey.

MIMNERMUS, a Greek elegiac poet, born at Smyrna, lived about 600 B.C. His life fell in the troubled time when the old Greek city of Smyrna was struggling to maintain itself against the rising power of the Lydian kings. His experience in life was evidently sad; he felt that his country was gradually yielding to the enemy it had once defeated, and he knew that his own hopes were disappointed.

MIMOSA. The *Mimosa* (so named from their mimicry of animal movements) form one of the three suborders of *Leguminosæ*, and are characterized by their (usually small) regular flowers and valvate corolla. Their twenty-eight genera and 1,100 species are arranged by Baillon in four series, of which the acacias (see ACACIA) and the true mimosas are the most important. They are distributed throughout almost all tropical and subtropical regions, the acacias preponderating in Australia and the true mimosas in America. The former are of considerable importance as sources of timber, gum, and tannin, but the latter are of much less economic value, though a few, like the talh (*M. ferruginea*) of Arabia and Central Africa, are important trees. Most are herbs or under shrubs, but some South American species are tall woody climbers. They are often prickly. The roots of some Brazilian species are poisonous, and that of *M. pudica*, L., has irritating properties. *M. sensitiva* has been used in America in the treatment of fistula, etc., probably as an astringent. The mimosas, however, owe their interest and their extensive cultivation, partly to the beauty of their usually bipinnate foliage, but still more to the remarkable development in some species of the sleep movements manifested to some extent by most of the pinnate *Leguminosæ*, as well as many other (especially seedling) plants. In the so-called "sensitive plants" these movements not only take place under the influence of light and darkness, but can be easily excited by mechanical and other stimuli. When stimulated, say at the axis of one of the secondary petioles, the leaflets move upward on each side until they meet, the movement being propagated centripetally. It may then be communicated to the leaflets of the other secondary petioles, which close (the petioles, too, converging), and thence to the main petiole, which sinks rapidly downward toward the stem, the bending taking place at the pulvinus, or swollen base of the leafstalk. When shaken in any way, the leaves close and droop simultaneously, but if the agitation be continued, they reopen as if they had become accustomed to the shocks. The common sensitive plant of hot houses is *M. pudica*, L., a native of tropical America, but now naturalized in corresponding latitudes of Asia and Africa; but the hardly distinguishable *M. sensitiva* and others are also cultivated. The common wild sensitive plants of the United States are two species of the closely allied genus *Schrankia*.

MINDANAO, MINDORO. See PHILIPPINE ISLANDS.

MINDEN, the chief town of a district of the same name in Prussia, province of Westphalia, is situated about twenty-two miles to the west-southwest of Hanover, on the left bank of the Weser, which is spanned there by two bridges. Population in 1880, 17,869.

MINE. See MINING.

MINERALOGY. Natural objects which are homogeneous in their mass, and in which no parts formed for special purposes can be distinguished, are termed "minerals"; and the branch of natural science which treats of these is termed mineralogy. Minerals differ from the structures treated of in botany and zoölogy in the three following particulars. They differ in the mode of their formation; this has been accomplished, not by assimilation of matter, producing growth from within, but by augmentation of bulk through accretion of particles from without. Minerals are not heterogeneous. While the objects treated of in the other departments of natural history consist of beings possessed of life, and having parts which, being mutually dependent, cannot be separated from one another without a more or less complete destruction of the individual, the objects treated of under the department of mineralogy have so uniformly consistent an individuality that they are not destroyed by any separation of parts—each portion or fragment possessing the same properties and the same composition as the whole. And while those beings which are possessed of life have their component elements grouped into complexes, for the most part capable of more or less freedom of motion and susceptible of change, minerals have a constitution resulting from chemical attractions alone and an arrangement of their parts, under physical influences, which has resulted in rigidity and an absence of all tendency to change.

The most precise definition of a mineral would be—an inorganic body possessed of a definite chemical composition, and usually of a regular geometric form. Of these, the second is in one respect the direct outcome of the first; while many of the most important physical properties possessed by minerals are outcomes of the second.

Both the geometric form and the composition of minerals are produced and modified under the influence of general laws.

Mineral bodies occur in the three physical conditions of solid, liquid, and gas. Those now found in the last two states are few in number, and are of altogether inferior interest to those which occur as solids; but there is reason to believe that the minerals we know as solids once existed in the liquid or gaseous state, and that their present structure was determined in the process of solidification. All bodies thus formed may be divided into two great classes:

Amorphous bodies, or such as do not possess a definite and characteristic geometrical form. These (when transparent) refract light singly in every direction (except when under stress); they are equally easy or equally difficult to break in all directions; when broken they exhibit a conchoidal or an earthy fracture; they are equally hard throughout all their parts; they are equally elastic in all directions; they conduct heat with equal rapidity and in equal amount in all directions.

Crystalline bodies, or such as occur in definite geometrical forms bounded by flat surfaces, present greater facilities of separation of their particles, or "cleavage," in certain directions lying in determinate planes than they do in others; most of them are neither equally hard nor equally elastic in all directions, conduct heat more rapidly in certain directions than they do in others, and, when transparent, refract light doubly except in certain directions.

Mineral bodies are found in both the above classes;

and the same mineral body may occur in both the amorphous and the crystalline condition. Under favoring circumstances, it is possible that every substance whose composition is capable of being represented by a definite chemical formula—*i.e.*, which has an unvarying composition—may be capable of assuming a definite crystalline form.

Size and Form of Crystals.—They are of every size from over a yard in diameter to mere specks requiring a high power of the microscope to reveal their existence. Beryls have been obtained in America more than 4 feet in length by $2\frac{1}{2}$ in thickness, weighing $2\frac{1}{2}$ tons. Equally large crystals of apatite have been found in Canada. There is a rock crystal at Milan $3\frac{1}{4}$ feet long by $5\frac{1}{2}$ in circumference, weighing 870 pounds. The highest perfection of form, and hence of other properties, is only found, however, in crystals of moderate or of small size.

Variety of Form, and Constancy of Form.—The same mineral may be found in different localities, or sometimes in the same locality, exhibiting an almost endless variety of forms. Calc-spar occurs at a Scottish locality in acicular pyramidal crystals of which the length may be ten or more times as great as the width; in flat plates as thin as paper, in which the length is not the hundredth part of the width; also in prisms, pyramids, and rhombohedra, which at first sight seem destitute of any relationship to each other. This substance has elsewhere been noted in several hundred forms. The minerals fluorite, pyrite, and baryte have each been observed in over a hundred diverse forms. Nevertheless, however great the number, all the forms, in the case of each mineral, may be reduced or referred to a single type, by the simple process of examining its internal structure or the mode of arrangement of its molecules. This is accomplished in two ways—by finding the weak joints in that arrangement, through splitting the crystal, and by measuring the angular inclination of the outside surfaces which bound the form and, from these measurements, by simple mathematical laws, arriving at what has been termed its "primitive" or simplest form.

As regards the mere recognition of a substance, such measurement in itself suffices—the angular inclination, if the same surfaces be measured, being unvarying in each species. It can, moreover, be shown that the possible range of external variety of form is governed by fixed mathematical laws, which determine precisely what crystalline forms are or may be produced for each species. Comparatively few of these actually occur in nature; but crystallographic laws can point out the range of those which can possibly occur, can delineate them even before they are found, and can in all cases show the relationship which subsists between them and the simple or fundamental form from which or out of which they all originate. It must be observed that in crystalline bodies the internal structure—that is, the arrangement of the molecules—is as regular in an outwardly shapeless mass as in the modeled crystal which presents itself as a perfect whole.

Definitions of Crystals, and their Members or Parts.—A crystal is a symmetrical solid, either opaque or transparent, contained within surfaces which theoretically are flat, and of a perfect polish, but which are actually frequently curved, striated, or pitted. The surfaces are called "planes," or "faces." The external planes of a crystal are called its "natural planes;" the flat surfaces obtained by splitting a crystal are called its "cleavage planes." The intersections of the bounding planes are called "edges," and planes are said to be similar when their corresponding edges are proportional and their corresponding angles equal. Crystals bounded by equal and similar faces are termed "simple forms."

The cube, bounded by six equal squares, the octahedron, bounded by eight equilateral triangles, and the rhombohedron, bounded by six equal rhombs, are thus simple forms. Crystals of which the faces are not all equal and similar are termed compound forms, or "combinations," being regarded as produced by the union or combination of two or more simple forms. Edges are termed rectangular, obtuse, or acute, according as the angle at which the faces which form the edge meet is equal to, or greater or less than, a right angle. Edges are similar when the planes by the intersection of which they are formed are respectively equal and equally inclined to one another; otherwise they are unlike or dissimilar.

When a figure is bounded by only one set of planes, it is said to be "developed." When an edge is cut off by a new plane, it is said to be "replaced;" when cut off by a plane which forms an equal angle with each of the original faces which formed the edge, it is said to be "truncated." When an edge is cut off by two new faces equally inclined to the two original faces respectively, it is said to be "beveled." When a solid angle is cut off by a new face which forms equal angles with all the faces which went to form the solid angle, it is said to be truncated.

In classifying crystals and studying their properties, it is found convenient to introduce certain imaginary lines called "axes." Axes are imaginary lines connecting points in the crystal which are diametrically opposite—such as the centers of opposite faces, the apices of opposite solid angles, the centers of opposite edges. Different sets of axes may thus be drawn through the same crystal; but there is always one set, usually of three, but in one special class of crystals of four, axes, by reference to which the geometrical and physical properties of a crystal can be most simply explained. These axes intersect one another, either at right angles, producing "orthometric" forms, or at oblique angles, producing "clinometric" forms. The axes may be all equal, or only two equal, or all unequal.

There is a definite conventional position in which for purposes of description a crystal is always supposed to be held. With reference to this position one of the axes—that which is erect or most erect—is termed the "vertical," and the others the "lateral." The planes in which any two of the axes lie are called the "axial" or "diametral planes"—sometimes "sections." By these the space around the center is divided into "sectants." If there are, as is generally the case, only two lateral axes, the space is divided into eight sectants, or octants; but, if there are three lateral axes, it is divided into twelve sectants.

There are few more interesting departments of science than the relation of mineral bodies to light, and the modifications which it undergoes either when passing through them or when reflected from their surface.

Though the varieties of luster admit of no precise or mathematical determination, they are of considerable value in mineralogy. One highly important distinction founded on them is that between minerals of metallic and of non-metallic aspect of character. Transparency and opacity nearly coincide with this division—the metallic minerals being almost constantly opaque, the non-metallic more or less transparent. Minerals which are perfectly opaque, and show the peculiar brilliancy and opacity of surface of polished metals, are named metallic; those which possess these properties in an inferior degree are semi-metallic; and those without these properties are non-metallic.

Color is a property which is of very inferior value. Minerals are so seldom, if ever, absolutely pure that

very minute quantities of an intensely colored impurity may impart color to a substance inherently colorless, or overpower a feebler color which may be its own.

Streak.—This name is applied to the appearance and the color of the line or furrow produced in minerals by drawing the edge of a hard tempered knife or file along their surface, or to the stain obtained by rubbing a soft mineral on such a substance as paper or porcelain. Taken along with the hardness, which may to a certain extent be determined by the same operation, it is one of the most valuable tests which we possess.

Diaphaneity.—Minerals, and even different specimens of the same species, vary much in this quality. Some transmit so much light that small objects can be clearly seen, or letters read, when placed behind them; such are named transparent. They are semitransparent when the object is seen only dimly, as through a cloud, and translucent when the light that passes through is so broken that the form of the object can be no longer discerned; some minerals are only thus translucent on the thinnest edges. Others transmit no light and are named opaque.

Most crystals—all, in fact, except those of the cubical system—exhibit the phenomena of double refraction.

Polarization.—Intimately connected with this property is that of the polarization of light, which affords an easier means of determining mineralogical characteristics than the direct study of double refraction.

Pleochroism.—Closely connected with double refraction is that property of transparent minerals named pleochroism (of many colors), in consequence of which they exhibit distinct colors when viewed by transmitted light in different directions. Crystals of the cubic system do not show this property, while in those of the other systems it appears in more or less perfection—in tetragonal and hexagonal minerals as dichroism (two colors), in the rhombic and clinic systems as trichroism (three colors). In most cases these changes of color are not very decided, and appear rather as different tints or shades than as distinct colors. The most remarkable of dichromatic minerals are the magnesian mica from Vesuvius, the tourmaline, and ripidolite; of trichromatic, iolite, andalusite from Brazil, diaspore from Schemnitz, and axinite.

Phosphorescence.—This is the property possessed by particular minerals of emitting light in certain circumstances, without combustion or ignition.

Thus some minerals appear luminous when taken into the dark, after being for a time exposed to the sun's rays or even to the ordinary daylight. Many diamonds, and also calcined barytes, exhibit this property in a remarkable degree; less so aragonite, calc-spar, and chalk. Many minerals, including the greater part of those thus rendered phosphorescent by the influence of the sun, also become so through heat. Thus some topazes, diamonds, and varieties of fluor-spar become luminous by the heat of the hand; other varieties of fluor-spar and phosphorite require a temperature near that of boiling water; while calc-spar and many silicates are only phosphorescent at from 400° to 700° Fahr.

Fluorescence is the property whereby rays of light of a refrangibility higher than those ordinarily seen by the human eye are rendered visible. The substance when placed in the violet end of the spectrum, and carried beyond it into the invisible rays, becomes luminous, through "degrading" the rays through extreme refrangibility. This property is well marked in those varieties of fluorite which are pale green by transmitted light, and deep purple by reflected light. Ozocerite and some petroleum also exhibit the property.

Electricity.—Friction, pressure, and heat may excite electricity in minerals. To observe this property deli-

cate electroscopes are required, formed of a light needle terminating at both ends in small balls, and suspended horizontally on a steel pivot by an agate cup. Such an instrument can be electrified negatively by touching it with a stick of sealing-wax excited by rubbing, or positively by merely bringing the wax so near as to attract the needle. When the instrument is in this state, the mineral, if also rendered electric by heat or friction, will attract or repel the needle according as it has acquired electricity of an opposite or of a similar kind; but if the mineral is not electric it will attract the needle in both conditions alike.

Magnetism.—This property is very characteristic of the few minerals in which it occurs—chiefly ores of iron or nickel. Some magnetic iron ores possess polar magnetism, or are natural magnets; while the common varieties of magnetic, meteoric iron, magnetic pyrites, precious garnet, and other minerals, are simply magnetic. Most minerals are only attracted by the magnet, but do not themselves attract iron.

Minerals, as other substances, have also been divided into magnetic and diamagnetic. (See MAGNETISM.)

Crystallomagnetic Action.—The magnetic polarity thus far alluded to belongs to the mass, and has no relation to crystalline form. There is also a kind of polarity directly related to the crystalline or optic axes of minerals. A crystal of cyanite, suspended horizontally, points to the north, by the magnetic power of the earth only, and is a true compass needle, from which even the declination may be obtained; and the line of direction is the line of the optic axes. Other crystals, which are called negative, take a transverse or equatorial position. The latter are diamagnetic crystals.

Conductivity for Heat.—Senarmont found that the conducting power of colloids and of crystals of the cubic system is equal in all directions, but that it varies in different directions in crystals belonging to all the other systems, exhibiting characters analogous to those deduced from their double refraction, conformable with the optic axes of the crystal, and referable, as in the latter case, to axes of elasticity, or unequal compression of the molecules.

Dilatation by Heat.—In crystals of those systems in which the molecules are arranged unequally as regards their axes, the amount of their dilatation when heated is unequal in the direction of their axes.

Hardness.—A harder body is distinguished from a softer, either by attempting to scratch the one with the other, or by trying each with a file. Each of these methods is used by the mineralogist in determining the hardness of the species, though the latter is in most cases to be preferred. Both methods should be employed when practicable.

Tenacity.—Solid minerals are said to be brittle, sectile, malleable, flexible, or elastic:—

1. *Brittle*, when parts of a mineral separate in powder or grains on attempting to cut it; as baryte, calc-spar.

2. *Sectile*, when pieces may be cut off with a knife without falling to powder, but still the mineral pulverizes under a hammer; as brucite, gypsum.

3. *Malleable*, when slices may be cut off and these slices flatten out under a hammer; as native gold, native copper.

4. *Flexible*, when the mineral will bend and remain bent after the bending force is removed; as gypsum, graphite, talc.

5. *Elastic*, when after being bent it will spring back to its original position; as mica.

When the tenacity of a mineral is overcome by an overwhelming amount of traction, or its elasticity by a sudden shock, its parts are separated, either in flat and continuous surfaces, or in surfaces which are irregular

in the extreme. The first of these modes is termed cleavage, the second fracture.

The number of the parallel cleavage-planes is altogether indefinite, so that the only limit that can be assigned to the divisibility of some minerals, as gypsum and mica, arises from the coarseness of our instruments. These minima of coherence, or cleavage-planes, are always parallel to some face of the crystal; and similar equal minima occur parallel to every other face of the same form. Hence they are always equal in number to the faces of the form, and the figures produced by cleavage agree in every point with true crystals, except that they are artificial. They are thus most simply and conveniently described by the same terms and signs as the faces of crystals.

Fracture.—This is the irregular manner in which substances may be broken. Even minerals possessed of cleavage may be fractured in other directions; but in amorphous bodies fracture alone occurs. The following varieties of fracture occur, and are highly characteristic:

1. *Conchoidal*, almost typical of amorphous bodies, but occasionally seen in crystals—rounded cavities, more or less deep. The name is taken from the resemblance to the successive lines of interrupted growth in a bivalve shell. Seen in flint, obsidian, asphalt. In calcite the direction of this fracture is intermediate to the planes of the mineral's cleavage.

2. *Even*, when the surface of fracture is smooth and free from inequalities.

3. *Rough*, when the surface of fracture is rugged, with numerous small elevations and depressions.

4. *Splintery*, when covered with small wedge-shaped splinters.

5. *Hackly*, when the elevations are sharp, slightly bent, or jagged, as broken iron.

6. *Earthy*, when it shows only fine dust.

Taste belongs only to soluble minerals. The different kinds adopted for reference are as follows:

1. *Astringent*, the taste of blue vitriol.

2. *Sweetish astringent*, taste of alum.

3. *Saline*, taste of common salt.

4. *Alkaline*, taste of soda.

5. *Cooling*, taste of saltpeter.

6. *Bitter*, taste of epsom salts.

7. *Sour*, taste of sulphuric acid.

8. *Pungent*, taste of sal-ammoniac.

9. *Metallic*, taste of zinc sulphate.

Odor.—Excepting a few gaseous and soluble species, minerals in the dry unchanged state do not give off odor. By friction, moistening with the breath, and the elimination of some volatile ingredient by heat or acids, odors are sometimes obtained which are thus designated:

1. *Alliaceous*, the odor of garlic. Friction of arsenical iron elicits this odor; it may also be obtained from any of the arsenical ores or salts by means of heat.

2. *Horse-radish odor*, the odor of decaying horse-radish. This odor is strongly perceived when the ores of selenium are heated.

3. *Sulphurous*. Friction will elicit this odor from pyrites, and heat from many sulphurets.

4. *Bituminous*, the odor of bitumen.

5. *Fetid*, the odor of sulphuretted hydrogen or rotten eggs. It is elicited by friction from some varieties of quartz and limestone.

6. *Argillaceous*, the odor of moistened clay. It is obtained from serpentine and some allied minerals after moistening them with the breath; others, as pyrargillite, afford it when heated.

7. *Empyreumatic* or *ozonic*. Quartz, when two portions strike one another.

Touch.—Some minerals are distinguished by a greasy feeling, as talc; others feel smooth, as celestine;

others meager, like clay; others cold. This last characteristic distinguishes true gems from their imitations in glass. Some, in virtue of their hygroscopic nature adhere to the tongue.

Influence of Chemical Composition on the External Characters of Minerals.—That the characteristics of a compound must to a certain extent depend on those of its component elements seems, as a general proposition, to admit of no doubt. Hence it might be supposed possible from a knowledge of the composition of a mineral to draw conclusions in reference to its form and its other properties; but practically this has not yet been effected.

Isomorphism.—Still more important is the doctrine of isomorphism, designating the fact that two or more simple or compound substances crystallize in one and the same form, or often in forms which, though not identical, yet approximate very closely. This similarity of form is generally combined with a similarity in other physical and in chemical properties. Among minerals that crystallize in the tesseral system, isomorphism is of course common and perfect, there being no diversity in the dimensions of the primary form; but for this very reason it is generally of less interest. It is of more importance among crystals of the other systems, the various series of which are separated from each other by differences in the proportions of the primary form. In these perfect identity is seldom observed, but only very great similarity.

MINERAL WATERS. No absolute line of demarcation can be drawn between ordinary and mineral waters. There is usually in the latter an excess of mineral constituents or of temperature, but some drinking waters contain more mineral constituents than others that are called mineral waters, and many very pure waters, both cold and warm, have been regarded for ages as mineral springs.

As to the origin of mineral waters, there is much in what the elder Pliny said, that waters are such as the soil through which they flow. Thus in limestone and chalk districts an excess of lime is usually present; and the waters of a peculiar district have much resemblance to each other—as in the Eifel, in Auvergne, and in the Pyrenees. But this is only a partial explanation, for waters are by no means necessarily uniform throughout a particular geological formation. We do not know with any certainty the depth from which various mineral waters proceed, nor the various distances from the surface at which they take up their different mineral constituents.

The source of the temperature of thermal waters remains a subject of much uncertainty. Among the assigned causes are the internal heat of the globe, or the development of heat by chemical or electrical agencies in the strata through which they rise.

Their occasional intermittance is doubtless often dependent on the periodical generation of steam, as in the case of the Geysers. A few geological facts are certain, which bear on the origin of mineral waters. Such springs are most abundant in volcanic districts, where many salts of soda and much carbonic acid are present. They occur most frequently at meetings of stratified with unstratified rocks, in saddles, and at points where there has been dislocation of strata.

The diffusion of mineral water is very extended. Pliny was quite correct in observing that they are to be found on alpine heights and arising from the bottom of the ocean. They are found at the snow in the Himalayas and they rise from the sea at Baiæ and Ischia. They are to be found in all quarters of the globe, but more particularly in volcanic regions, as in the Eifel and Auvergne, in the Bay of Naples, and parts of

Greece, in Iceland, New Zealand, and Japan. But there are few countries in which they are not to be found, except in very flat ones and in deltas of rivers—for instance, in the north of France, where they are very few, and in Holland, from which they are absent. France, Germany, Italy, and Spain, as well as Greece, Asia Minor, and the Caucasus, are all rich in mineral waters. The British Isles have a fair though not very large proportion of them. There are a few in Sweden and Norway. They are abundant in the United States, less so in Canada. They are found in the Azores and in the West India Islands. Of their occurrence in the interior of Africa or of Australia we know little; and the same is true of South America. But they are met with in Algiers, in Egypt, and in the Holy Land. The vast Indian peninsula has for its size a comparatively small supply. Mineral waters, when analyzed, are found to contain a great many substances, although some of them occur only in very minute quantities—soda, magnesia, calcium, potash, alumina, iron, boron, iodine, bromine, arsenic, lithium, caesium, rubidium, fluorine, barium, copper, zinc, manganese, strontium, silica, phosphorus, besides extractive matters, and various organic deposits known under the name of glairin or baregin. Of gases there have been found carbonic acid, hydrosulphuric acid, nitrogen, hydrogen, oxygen, and ammonia. Of all these by far the most important, in a therapeutic point of view, are sodium, magnesia, and iron, carbonic acid, sulphur, and perhaps hydrosulphuric acid. These substances, detected separately by chemists, are in their analyses combined by them into various salts, if not with absolute certainty, undoubtedly with a close approximation to it. Those combinations are very numerous, and some waters contain ten to twenty of them; but there are always some predominating ones, which mark their character, while many of them, such as caesium, rubidium, or fluorine, occur in mere traces, and cannot be assumed to be of any real importance. Mineral waters, therefore, resolve themselves into weaker or stronger solutions of salts and gases in water of higher or lower temperature. For medical purposes they are used either externally or internally, for bathing or for drinking. As the quantity of salts present commonly bears but a very small proportion to that of the fluid containing them, water becomes a very influential agent in mineral-water treatment, about which it is therefore necessary to say something.

It seems to be ascertained that drinking considerable amounts of cold water reduces the temperature of the body, diminishes the frequency of the pulse, and increases the blood pressure temporarily. Water when introduced into the stomach, especially if it be empty, is quickly absorbed; but, although much of the water passes into the veins, there is no proof that it ever produces in them, as is sometimes supposed, a state of fluidity or wateriness. Therapeutically, the imbibition of large quantities of water leads to a sort of general washing out of the organs. This produces a temporary increase of certain excretions, augmented diuresis, and a quantitative increase of urea, of chloride of sodium, and of phosphoric and sulphuric acids in the urine. Both the sensible and the insensible perspirations are augmented. A draught of cold water undoubtedly stimulates the peristaltic action of the intestines. On the whole water slightly warm is best borne by the stomach, and is more easily absorbed by it than cold water; and warm waters are more useful than cold ones when there is much gastric irritability.

The history of the use of mineral waters can only just be alluded to. They have been employed from the earliest period, and traces of Roman work have been

found at most of the European baths which are now in favor—at almost all the thermal ones. Occasionally new springs are discovered in old countries, but the great majority of them have been long known. They have varied in popularity, and the modes of applying them have also varied, but less so than has been the case with most of the ordinary medicines. Warm waters, and those containing small quantities of mineral constituents, appear to have remained more steadily in favor than any other class within the appropriate sphere of mineral waters, which is limited to the treatment of chronic disease.

MINERVA (*i.e.*, *menes-va*, endowed with mind) was the Roman goddess who presided over all handicrafts, invention, arts, and sciences. She was probably an Etruscan deity, but her character was modified on Roman soil through her identification with the Greek Pallas Athena (see ATHENA). No legend of her birth was recorded; the Roman deities were abstractions, not distinct persons with an individual history. Her chief worship in Rome was in the temple built by Tarquin on the Capitol, where she was worshiped side by side with Jupiter and Juno. The dedication day of the temple and birthday of the goddess was March 19th, and this day was the great festival of Minerva, called *quinquatrus* because it fell on the fifth day after the Ides. The number five was sacred to the goddess. All the schools had holidays at this time, and the pupils on reassembling brought a fee (*minerval*) to the teachers. In every house also the *quinquatrus* was a holiday, for Minerva was patron of the women's weaving and spinning and the workmen's craft. At a later time the festival was extended over five days, and games were celebrated.

MINGRELIA, a former principality of Transcaucasia, which became subject to Russia in 1804, and since 1867 has constituted three circles of the government of Kutais—Letchgum, Senakh, and Zugdidi. The country corresponds to the ancient Colchis; and Izgaur or Iskuriah on the Black Sea coast, which was the capital during the period of Mingrelian independence under the Dadian dynasty, is to be identified with the ancient Dioscurias, a colony of Miletus. The Mingrelians (still almost exclusively confined to the Mingrelian territory, and numbering 197,000) are closely akin to the Georgians. (See CAUCASUS and GEORGIA.)

MINIATURE is a term which by common usage has come to be applied to two different branches of painting. Derived from the Latin word *minium*, the red pigment used in the primitive decoration of MSS., in the first place it is the technical word employed to describe a painting in a MS.; and, from the fact of such pictures being executed on a reduced scale, it has its secondary and modern signification of a small, or miniature, portrait. In the latter sense it belongs to the general subject of painting.

The rise of the art of ILLUMINATION, in which the miniature plays so important a part, has been described under that heading; and something has been said in that place about the earliest extant specimens of miniature painting. Of Greek miniatures there are still many fine examples extant, but, excepting those which have been noticed above, there are few which are earlier than the eleventh century. At this period the miniature appears in the set form which it retained for the next two or three hundred years; and the connection between its style and that of the mosaics is too evident for us to be at a loss to explain the course of development. The figure drawing is delicate, but rather exaggerated in length; the colors are brilliant; the whole effect is heightened by glittering backgrounds of gold.

MINIMS. See FRANCIS (ST.) OF PAOLA.

MINING. The art of mining consists of those processes by which useful minerals are obtained from the earth's crust. This definition is wider than what is popularly known as mining, for it includes not only underground excavations but also open workings; at the same time it excludes underground workings which are simply used for passages, such as railway tunnels and sewers, and galleries for military purposes. We must remark also that the word "mine," or its equivalent in other languages, varies in signification in different countries on account of legal enactments or decisions which define it. Thus, in France and Belgium, the workings for mineral are classified by the law of 1810, according to the nature of the substance wrought, into *mines*, *minières*, et *carrières*. In the United Kingdom, on the contrary, it is the nature of the excavation which decides the question for certain legislative purposes, and the term mine is restricted to workings which are carried on underground by artificial light. The consequence is that what is merely an underground stone quarry in France becomes a true mine in England, while the open workings for iron ore, such as exist in Northamptonshire, would be true mines under the French law.

Manner in which the Useful Minerals Occur.—The repositories of the useful minerals may be classified according to their shape as (A) tabular deposits, and (B) masses.

Tabular Deposits.—These are deposits which have a more or less flattened or sheet-like form. They may be divided, according to their origin, into beds or strata, and mineral veins or lodes.

Geology teaches us that a large proportion of the rocks met with at the surface of the earth consists of substances arranged in distinct layers, owing to the fact that these rocks have been formed at the bottom of seas, lakes, or rivers by the gradual deposition of sediment, by precipitation from solutions, and by the growth or accumulation of animal and vegetable organisms. If any one of these layers consists of a useful mineral, or contains enough to make it valuable, we say that we have a deposit in the form of a bed, stratum or seam. Of course the most important of all bedded or stratified deposits is coal, but, in addition, we have beds of anthracite, lignite, iron ore (especially in the Oolitic rocks), cupriferous shale, lead-bearing sandstone, silver-bearing sandstone, diamond-, gold-, and tin-bearing gravels, to say nothing of sulphur, rock-salt, clays, various kinds of stone, such as limestone and gypsum, oil-shale, alum-shale, and slate.

The characteristic feature of a bed is that it is a member of a series of stratified rocks; the layer above it is called the *roof* of the deposit, and the one below it is the *floor*. Its *thickness* is the distance from the roof to the floor at right angles to the plane of stratification; its *dip* is the inclination downward measured from the horizontal; its *strike* is the direction of a horizontal line drawn in the middle plane.

The thickness of beds that are worked varies within very wide limits. While the thickness of certain workable beds of coal is only one foot, we find on the other hand beds of lead-bearing sandstone no less than eighty-five feet thick, and beds of slate far exceeding that thickness. It must not be supposed, however, that the thickness of a bed necessarily remains uniform. Occasionally this is the case over a very large area; but frequently the thickness varies, and the bed may dwindle away gradually, or increase in size, or become divided into two, owing to the appearance of a parting of valueless rock.

Veins or lodes are tabular or sheet-like deposits of mineral which have been formed since the rocks by which they are surrounded; they differ, therefore, by

their subsequent origin from beds, which, as just stated, are of contemporaneous origin with the inclosing rocks (although of course cases occur in which the deposit is lying unconformably upon very much older strata, or is covered unconformably by very much younger strata). It is necessary to explain that the term "vein" in this definition is used in a more restricted sense than is sometimes customary among miners, who speak of *veins* of coal, clay ironstone, and slate, which geologically are true beds. They see a band of valuable mineral or rock, and, careless of its origin, call it metaphorically a vein or seam. On the other hand, the definition is broader than that which prevails among some geologists, who would confine the term vein to deposits occupying spaces formed by fissures.

Masses are deposits of mineral, often of irregular shapes, which cannot be distinctly recognized as beds or veins. These may have been formed by the percolation of water bringing down iron in solution from overlying Triassic rocks. Examples of masses are the calamine deposits of Altenberg, Sardinia, and Lombardy, the iron ore deposits in Missouri, such as Iron Mountain and Pilot Knob, the huge upright "necks" or "pipes" of diamantiferous rock in South Africa, and the granite decomposed *in situ* worked for china clay in Cornwall. The object of the prospector is to discover valuable deposits of mineral. This search is beset with many difficulties; the outcrops of mineral deposits are frequently hidden by soil; the nature of the deposit itself is generally entirely changed near the surface; and, in addition to this, the explorer may have to pursue his work in trackless forests far away from any settlements.

The prospector seeks for natural sections of the rocks, such as occur in cliffs or in river valleys and their tributary gullies and gorges; he examines the materials constituting the river beds, often digging up and washing portions in a pan, in order to ascertain whether they contain traces of the heavy ores or metals. If, while prospecting in a valley, he discovers stones that have the appearance of having once belonged to veins, he endeavors to trace them to their source, and is perhaps rewarded by finding similar fragments, but less water-worn, as he goes up the stream; further on he may come upon large blocks of vein stuff lying about, and finally find the vein itself laid bare in a gorge, or at the bottom of a brook, or possibly projecting above the soil in the form of huge crags of quartz. Thus at the Great Western quicksilver mine in California the outcrop of the vein appears as a dike over 100 feet wide, and having precipitous sides, in places seventy-five feet high.

After having acquired an idea of the position of a vein or seam by some of the surface indications just mentioned, it is necessary, before attacking it by shafts or levels, to obtain more certain data concerning it. In the case of mineral veins, trenches are dug at right angles to the supposed strike; and when the upper part of the deposit has been cut in several places, its general course and dip can be determined sufficiently for the purpose of arranging the future workings.

Where the mineral to be wrought occurs as a bed or mass, the process of boring is resorted to, and indeed this method is also applied in the case of veins, especially in the United States.

The object of boring is to reach a deposit by a small hole and ascertain its nature, its depth from the surface, thickness, dip, and strike. Bore-holes are also used for obtaining water, brine, and petroleum, which either rise to the surface or have to be pumped up from a certain depth, and finally for tapping water in old workings or for effecting ventilation. The methods of boring may be classified as boring with the rod; boring with the rope; boring with the diamond drill.

The kind of ground in which mining excavations have to be carried on varies within the widest limits, from loose quicksands to rocks which are so hard that the best steel tools will scarcely touch them.

Loose ground can be removed with the shovel, but in the special case of peat sharp spades are employed, which cut through the fibers and furnish lumps or sods of convenient form for drying and subsequent use as fuel. What is called *fair, soft*, or easy ground, such as clay, shale, decomposed clay-slate, and chalk, requires the use of the pick and the shovel. When the ground, though harder, is nevertheless "jointy," or traversed by many natural fissures, the wedge comes into play.

We now come to hard ground; and in this class we have a large proportion of the rocks met with by the miner, such as slate of various kinds, hard grits and sandstone, limestone, the metamorphic schists, granite, and the contents of many mineral veins. Rocks of this kind are attacked by boring and blasting. The tools employed are the jumper, the borer or drill, the hammer, the sledge (*mallet*, Cornwall), the scraper and charger, the tamping bar or stemmer, in some places the pricker or needle, the claying bar, the crowbar, and finally the shovel for clearing away the broken rock.

Holes for blasting are sometimes bored by tools like carpenters' augers. One of the simplest, which is used in some French slate-mines, is very like a brace and bit, and the tool is kept pressed against the rock by means of a screw fixed in a frame resting on the ground.

In addition to these tools the miner requires an explosive, and a means of firing the charge at the bottom of the hole which will give him time to escape. Twenty years ago gunpowder was the only explosive in common use in mines, but at the present day its place has been taken to a very large extent by mixtures containing nitro-glycerine or gun-cotton. The powder used for blasting in mines usually contains less saltpeter than that which is employed for sporting or military purposes.

Nitro-glycerine or glyceryl nitrate is a light-yellow oily liquid which is very sensitive to shocks; under the action of a fulminating cap it explodes with great violence. It has been found so dangerous that its use by itself has been given up; but on the other hand the mixture of nitro-glycerine and infusorial earth, called dynamite or giant powder is now one of the commonest explosives met with.

Gun-cotton *per se* is not much in favor in ordinary mining; but mixed with some nitrate or mixture of nitrates, such as the nitrates of barium and potassium, and known as cotton powder, tonite, and potentite, it is employed extensively.

The commonest method of firing a charge is by means of the *safety-fuse*, a cord containing a core of gunpowder introduced during the process of manufacture; it may be rendered waterproof by tar or gutta-percha.

Charges may be readily fired singly or simultaneously with the aid of electricity, either of high tension obtained from a frictional, magneto-electric, or dynamo-electric machine, or of low tension from a galvanic battery. The former is preferred. One of the greatest improvements in the art of mining during the last few years has been the introduction of machinery for boring holes for blasting; most of the machines imitate percussive boring by hand, but a few rotary machines are also in use. A percussive drill or perforator consists of a cylinder with a piston to which the drill is fastened. Compressed air is made to act alternately on each side of the piston, and in this manner the drill receives its reciprocating motion. Various arrangements have been adopted for securing the automatic rotation of the drill. In some cases also the advance forward

of the machine, as the hole is deepened, is also effected automatically; but in many of the best drills this work is left to the man in charge.

As a large proportion of the expenditure in mining is for actual manual labor, it is very important that means should be taken to prevent any waste in this department. Three principles are in vogue—payment by time, by work done either measured or weighed, and by the value of the ore extracted.

The overseers, called captains in many metal mines, are naturally paid by the month, and where strict supervision can be exercised, such as is possible at the surface, on the dressing-floors for instance, the same principle may be adopted; but when men are working underground, and often in small gangs of only two or three persons at some distance apart, piecework of some kind is more economical and satisfactory in every way.

In driving levels and sinking shafts it is usual for the men to work at a certain price per running yard or fathom. The agents have to see that the excavation, whether shaft or level, is maintained of the full dimensions agreed upon, and preserved in the proper direction. At the end of a certain time, generally a month, the work is measured by the agent. From the gross amount obtained by multiplying the price by the number of fathoms driven or sunk it is necessary to deduct the cost of the materials supplied to the men by the mining company, such as explosives, steel, candles, etc., and the remainder is divided among the persons who took the contract. When the useful mineral is being obtained the men may be paid at so much per cubic yard or fathom excavated, or at so much per ton of mineral extracted; the overseer of course has to see, in this latter case, that worthless rock is not sent to the surface. Payment by the number of inches bored is a method in use in some countries, where the men are not experienced or enterprising enough to undertake the work in any other way. A foreman points out to the men the position and direction in which the holes must be bored, measures them when completed, and subsequently charges and fires them.

The third method is that which is known as the tribute system. The miner working on tribute is allowed to speculate upon the value of the ore in a certain working area assigned to him and called his *pitch*. He gives the mining company all the ore he extracts at a certain proportion of its value, after he has paid all the cost of breaking it, hoisting it to the surface, and dressing it.

The following kinds of timber are those most frequently employed for securing excavations underground: oak, larch, pitch pine, spruce fir, and acacia. In many mines the timber is attacked by dry rot, which gradually renders it useless, and when the timber has often to be renewed the expense may be very considerable. Various methods of preventing dry rot have been tried with more or less success, such as letting water trickle over the timber in the mine or treating it with preservative deposits beforehand.

The deposit must first of all be reached by a shaft, or, where the contour of the country permits it, by a level. In the case of a vein an exploratory shaft is often sunk on the course of the lode for twenty or thirty fathoms, and, if the indications found in a level driven out from this shaft warrant further prosecution of the mine, a first working shaft is sunk to intersect the lode at a depth of 100 fathoms or more from the surface. Crosscuts are then driven out at intervals of ten, fifteen, or twenty fathoms to reach the lode. Sometimes the main shafts are carried down all the way along the dip of the deposit, though perpendicular shafts have the advantages of quicker and cheaper

winding and cheaper pumping, to say nothing of the possibility of utilizing the cages for the rapid descent and ascent of the miners. If an inclined shaft appears to be advisable, great care should be taken to sink it in a straight line. In either case levels are driven out along the strike of the lode, in the hopes of meeting with valuable ore bodies. For the purpose of affording ventilation, and still further exploring the ground and working it, intermediate shafts, called *winzes* (Cornwall) or *sumps* (North Wales), are sunk in the lode.

After the mineral has been broken down in a deposit it is necessary to pick out any barren rock and then convey to the surface all that is of value.

The simplest and oldest method of transport along underground roads is carriage on the back, and this method may still be seen at the present day even in countries where the art of mining is generally highly advanced. Sledges, or *sleds*, enable greater loads to be transported; but they are not available unless the conveyance is along roads sloping downward. They have been largely employed in coal mines, and are still resorted to in some collieries for conveying the coal from the working place to the nearest tram-road.

We next come to wheeled carriages. The simplest is the wheelbarrow. The barrow used in Cornwall at the present day is not unlike that figured by Agricola. The navvy's barrow is more advantageous, but it requires a wider and higher level. The barrow runs upon the natural floor of the level, upon boards, or upon thin strips of iron. Carts drawn by horses may be used in large underground quarries. Excepting in special cases it is advisable to replace barrows by wagons running upon rails. The oldest form is the German *Hund*. It consists of a rectangular wooden body, with four wheels, resting upon two boards as rails, and it is kept on the track by a pin which runs between the boards.

Cast-iron tram-plates were introduced in the last century, and were finally succeeded by iron rails, which are now in general use, though steel threatens to displace iron in this as in other departments of mining.

The form and size of the wagons running upon the rails necessarily vary according to the size of the underground roads and the manner in which the mineral is raised in the shaft. The most modern system in metal mines is to imitate collieries, and use wagons which are drawn up in cages.

In beginning to sink a shaft from the surface, or in sinking a winze, hand-power applied by a windlass is sufficient. The broken rock at the bottom of the shaft is shoveled into a wooden or iron bucket, which is drawn up by a rope passing round the barrel of the windlass. When a depth of twenty or thirty yards has been reached it is more advantageous to introduce horse-power, and the usual machine by which this power is applied, called a *gin* or *horse-whim*, is a common sight in many metalliferous districts. Where steam and water-power are not available, a large number of horses or mules are sometimes harnessed to whims, and ore raised from depths of 200 fathoms. These, however, are exceptional cases; and, especially since the introduction of portable engines, the use of steam-power even for comparatively small depths, such as 100 yards, is daily increasing. In hilly districts water-power is generally at hand, and huge reservoirs are frequently constructed for storing the rainfall, and so affording an adequate and constant supply. It may be utilized by water-wheels, turbines, and water-pressure engines.

The mineral having been raised to the surface, the task of the miner might appear to be at an end; but this is not the case, for it is further necessary that he should keep his mine free from water and foul air. These two

indispensable operations of draining and ventilating frequently require special appliances which add considerably to the general cost of mining.

In all cases where it is possible, endeavors should be made to keep the water out of a mine, so as to save the expense of pumping it; and the method of putting in a watertight lining (*tubbing*) in a shaft has been already described (see COAL). When large streams of water happen to be intersected by underground workings, and threaten to overpower the available pumping machinery, or when it is advisable to save the expense of draining abandoned workings, the entry of this water into the mine may often be prevented by stoppings, called *dams*, constructed of timber or brickwork.

In spite of all precautions, the miner generally has to contend with water which percolates into the workings. Four methods of getting rid of this water are available, viz., adits, siphons, winding machinery, and pumps.

An adit, day-level, or sough is a nearly horizontal tunnel with one end opening at the surface, allowing the water to drain away naturally. In hilly countries mines are often worked entirely by adits, and even when a mine is deepened below the drainage level the utility of the adit is still threefold—it lessens the quantity of water which tends to percolate into the lower workings; it lessens the depths to which the water has to be pumped; and, by furnishing a certain amount of fall, it enables water to be applied as power. On account of these important advantages some very long and costly adits have been driven for the purpose of aiding the miners in certain metalliferous districts.

In the United States the famous Sutro tunnel is an adit of which the main branch, four miles in length, reaches the great Comstock lode in Nevada at a depth of 1,700 feet. The total cost of this tunnel, which was completed in nine years, is estimated to have been \$7,000,000. The quantity of water running out daily in 1879 was 12,000 tons, at a temperature of 123° Fahr. at the mouth of the tunnel. All this water must otherwise have been pumped to the surface at a cost estimated at \$3,000 a day. The obstacles to progress were very great; not only was the heat extreme, but swelling ground was encountered which snapped the strongest timber.

Siphons have been used for unwatering workings in special cases; but, of course, they will not act unless the barrier over which the water is raised is very decidedly less than thirty-three feet. When workings cannot be drained by tunnels or siphons it is necessary to raise the water mechanically, either to the surface or at all events to an adit through which it can flow away naturally. If the amount of water is not too considerable, it is often convenient to use the winding machinery and draw up the water in special buckets (*water-barrels*) or tanks. The bucket may be tilted over on reaching the surface, or it may be emptied by a valve at the bottom. This means of raising water is often adopted while sinking shafts, when it may be desirable to wait till the whole or a portion of the shaft is completed before putting in the final pumping machinery.

The varieties of pumps used in mines are numerous. In small sinkings hand-pumps, either direct-acting or rotary, may be applied; steam-jet pumps on the principle of the Giffard injectors are also used; and pulsometers, though requiring a large expenditure of steam, have the advantages of being quickly fixed, of occupying little space, and of working with sandy or muddy water. They are capable, therefore, of rendering great services in special cases. When we come to the definitive machinery erected in large mines of considerable depth, we

find that the prevailing types of pumps are few. They may be classified as follows: Lifting and force pumps worked by rods in the shaft actuated by wind, water, or steam power; force-pumps at the bottom of the shaft worked by steam, compressed air, or hydraulic pressure.

The composition of the air of the atmosphere is about one-fifth by volume of oxygen and four-fifths of nitrogen, with a little carbonic acid gas; more exactly, the standard amount of oxygen may be taken at 20.9 per cent., and that of the carbonic acid gas at 0.03 per cent. The atmosphere of mines is subject to various deteriorating influences; not only do noxious gases escape from the rocks into the underground excavations, but also the very agents employed in the execution of the work itself pollute the air considerably.

The dangerous emanations of fire-damp in collieries have been already described (see COAL); and with reference to this gas it is simply necessary to say that its presence is not entirely confined to coal mines. Large quantities have been observed in Silver Islet mine, Lake Superior, where several explosions have occurred, while small quantities are met with in the stratified ironstone of Cleveland, and also in the Cheshire salt mines; jets of the gas may be seen constantly burning in the salt mine at Bex in Switzerland; a little has been noticed also in lead mines in Wales and Derbyshire. In the Sicilian mines the amount given off by the black carbonaceous shales interstratified with the sulphur beds is sufficient to cause dangerous explosions. It has been pointed out that carbonic acid gas exudes from coal; it escapes also from some mineral veins. At the lead mines of Pontgibaud in central France it is so abundant that special fans have to be provided for getting rid of it; very distinct issues of this gas may be observed at the Foxdale mines in the Isle of Man, and in the Alston Moor district it is not uncommon. This gas is likewise given off in the Sicilian sulphur mines, where also the highly poisonous sulphuretted hydrogen is of frequent occurrence, the water in the workings being often saturated with it. Small quantities of mercurial vapor occur in quicksilver mines.

Having explained the reasons why the air of mines must be constantly renewed, we must now point out how this desirable end is effected.

Two systems are employed—natural ventilation and artificial ventilation; but, as both systems have been described (see COAL), little remains to be said here, especially as the ventilating machines in metalliferous mines generally cannot for one moment be compared with the powerful appliances employed in collieries. In vein-mining there are generally many more shafts than in collieries, and natural currents are set up which are often considered sufficient for ventilating the mines; nevertheless, the advanced workings, such as the ends, rises, and winzes—in fact all workings in the form of a *cul-de-sac*—are likely to require special means of ventilation as soon as they proceed a little distance from the main air-current.

Mines are lighted by lamps, torches, candles, and electricity. The subject of safety lamps for fiery mines has already been discussed (COAL), and consequently the question of illuminating mines may be treated in a very summary manner.

Lamps vary very much in shape and size. The Sicilian miner has a mere shallow cup of unglazed pottery, the Saxon a small tin or brass lamp in a wooden box lined with tinplate and open in front. In the Harz the miner prefers a heavy flat iron lamp with a hook by which it is stuck into the timber or any crack in the rocks; in France, northern Italy, and parts of Spain, the iron lamp is lenticular in shape and also suspended by a hook. In Scotland, and parts of Germany and the

United States, a small tin lamp of the shape of a coffee pot is very common.

The miners of England and Wales still cling to the tallow candle; and when surrounded by a lump of clay it can easily and quickly be fixed in the working place or carried upon the hat when climbing. Gas brought down from the surface answers for illuminating large excavations, such as on-setting places and engine-rooms.

Up to the present time the electric light has been but little used underground on account of its want of portability, and the smallness of the spaces requiring illumination.

Among the first successful applications of electric lighting to underground excavations may be mentioned that of M. Blavier at the Angers slate quarries. The large chambers in the salt mine of Maros-Ujvár in Hungary have been regularly lighted up by electricity since 1880.

Where mines are worked by adit-levels the men naturally walk in along the ordinary roadways; such mines, however, are exceptional, and the men generally have to climb down and up by ladders, or are raised and lowered by machinery. The means of access to and from workings may be classified as follows:—(1) steps and slides; (2) ladders; (3) cages; (4) man-engines.

Ladders are very largely used in metal mines all over the world, but they vary a good deal in different countries. In many cases sufficient attention is not paid to the angle of inclination of the ladders. A ladder is climbed with the least fatigue when the person uses his arms simply to steady himself, and is not compelled to pull himself up by them, as on a vertical ladder, or to support much of the weight of his body by them, as happens with a very flat one. The best angle is about 20° from the vertical, and in Belgium the authorities have very wisely decreed that no ladder shall be inclined at an angle of less than 10° from the vertical. In collieries and other mines worked by perpendicular shafts, it has long been customary to raise and lower the men by the ordinary winding machinery already described.

The first man-engine was put up in the Harz in 1833, and nine years later a similar machine was fixed in Tresavean mine in Cornwall. Since that time this very useful means of conveying workmen up and down shafts has been resorted to in other mining districts, and especially in Belgium and Westphalia.

In a large number of cases the mineral, as it is raised from the mine, is not ready for sale. It usually requires to be subjected to mechanical processes whereby the good ore is entirely or partly freed from valueless vein-stone. These processes, which in a few special instances are aided by calcination in furnaces, are known as the dressing or mechanical preparation of the ores. As a rule the valuable ore is specifically heavier than the vein-stone, and most of the separating processes are based upon the fact that the heavy particles of ore will fall in water more quickly than the light particles of vein-stone.

The processes of mechanical preparation may be classified as follows:—(1) washing and hand-sorting; (2) disintegration, or reduction in size; (3) classification by size or by equivalence; (4) concentration.

(1) Sometimes the ore coming from the mine requires simply to be freed from adhering particles of clay in order to be rendered fit for sale, at other times the washing is necessary as a preliminary process previous to sorting by hand. The operation is performed either by raking the ore backward and forward upon a grating under a stream of water, or in a box containing water, or, thirdly, by means of an inclined revolving iron drum worked by hand or any other motive power. The machines used for this purpose, known as washing trom-

mels, are revolving cylinders or truncated cones of sheet-iron provided with teeth inside. The ore is fed in at one end, is subjected to the action of a stream of water, and is discharged at the other end. The *stuff*, i.e., the mixed ore, vein-stone, and country rock, having been cleansed, it is now possible to make a separation by hand. Women and children are generally employed for this work, as their labor is cheaper and their sight sharper than that of men. The stuff is spread out on a table, and various classes are picked out according to the nature of the products furnished by the mine.

(2) Reduction in size is necessary for two reasons. Even when an ore is sufficiently clean for the smelter, the large lumps are often crushed by the miner for the sake of obtaining a fair sample of the whole, or supplying a product which is at once fit for the furnace. The chief reason, however, for disintegration lies in the fact that the particles of ore are generally found inclosed in or adhering to particles of barren vein-stone.

The disintegration is effected by hand or by machinery. Large blocks of ore and vein-stone are broken by men with large sledge hammers, and the reduction in size is continued very often by women with smaller hammers. Sometimes the blow of the hammer is directed so as to separate the good from the poorer parts, and hand-picking accompanies this process, called *cobbing*. Ore may be crushed fine by a flat-headed hammer (*bucking iron*) on an iron plate.

The machines used for reducing ores to smaller sizes are very numerous; those most commonly used are stone-breakers, stamps, rolls, mills, and centrifugal pulverizers.

(3) Classification of a crushed ore into sizes is absolutely necessary in some cases and advisable in others, because the subsequent concentration is dependent upon the fall of the particles in water, as will be presently explained. Classification by size is effected by sieves. Hand sieves and flat sieves placed one above the other have been superseded at most dressing establishments by cylindrical or conical revolving screens known as trommels. These screens are made of wire web or of perforated sheets of metal, and they are often arranged so as to discharge one into the other, so that the ore from a crusher can quickly be separated into classes of various sizes.

With sizes of less than one millimeter ($\frac{1}{25}$ inch) trommels are no longer employed, and recourse is had to the so-called separators or classifiers. These are boxes in the shape of inverted cones or pyramids into which the finely crushed ore is brought by means of a current of water; a jet of clean water is often made to rise up in the bottom; the larger and the specifically heavier particles fall and are discharged with a stream of water at or near the bottom, while the smaller and specifically lighter particles flow away at the top. The separators do not effect a true classification by size; they merely cause a division by *equivalence*, a term which will be explained immediately.

(4) We now have to deal with the enriching of the ore, or the concentration of the valuable particles into as small a bulk as is economically advantageous. The concentration is generally brought about by the fall of the particles in water. Occasionally the fall in air is utilized; mercury is employed as a collecting agent in the case of gold and silver, and in a few instances magnetism can be applied.

The concentration of water depends upon the difference in specific gravity of the valuable ore and the waste vein-stone or rock. A piece of galena with a specific gravity of 7.5 sinks to the bottom more quickly than a similar piece of quartz, the density of which is only 2.6. Nevertheless a large piece of quartz may fall to the bot-

tom as quickly as a small piece of galena. Particles which have equal velocities of fall, though differing in size and specific gravity, are said to be *equal-falling* or *equivalent*. Consequently, before we can separate properly by water it is necessary to classify the particles by size, so that equivalence shall not prevent a separation or lessen its sharpness. It is nevertheless true that in the early part of the fall of equivalent grains the influence of the specific gravity preponderates, and the denser particles take the lead; therefore, by a frequent repetition of very small falls, particles which have not been closely sized may still be separated.

The principal machine for concentrating particles of sizes ranging between one inch and one-fiftieth inch is the jig or jigger. The hand jigger is merely a round sieve which is charged with the crushed ore and then moved up and down in a tub full of water. The particles gradually arrange themselves in layers, the heaviest on the bottom and the lightest at the top. On lifting out the sieve the light waste can be skimmed off with a scraper, leaving the concentrated product below ready for the smelter or for further treatment. Similar sieves worked by machinery were for a long time employed in dressing establishments, but the introduction of the improved continuous jiggers has led to their abandonment in all work of any importance. The continuous jigger is one of the most useful dressing machines of the present day.

The principal machines for concentrating fine sands and slimes are the frame, rotating frame, percussion frame, side-blow percussion frame, revolving belt and Frue vanner, the hand buddle, the round buddle, and the keeve.

The principal improvements that have been made in metal-mining during the last quarter of a century are as follows: Diamond-drill for prospecting; machine drills for driving, sinking, and stoping; use of compressed air for winding underground; stronger explosives, especially the nitro-glycerine compounds, dynamite and blasting gelatine; increased use of steel for various purposes; Blake's stone-breaker and continuous jiggers; extended application of hydraulic mining; larger employment of electricity both for blasting purposes and for signaling by telegraph and telephone. It may be reasonably hoped that ere long electricity will render increased services to the miner for lighting the workings and for the transmission of power.

(4) Mining is one of the occupations that may decidedly be called hazardous. This fact has been thoroughly impressed upon the public mind by explosions of fire-damp in collieries; but, though accidents of this kind are appalling, owing to the number of victims who perish at one time, fire-damp is by no means the worst enemy with which the miner has to contend. Falls of roof and sides in both collieries and metal mines are far more fatal in their results.

United States.—The mineral wealth of the United States is admirably summed up by Mr. Richard P. Rothwell in his address to the American Institute of Mining Engineers. "*Production of Coal, Metal and Petroleum in 1881.*"

"Anthracite.....	30,261,940	tons (of 2,240 lb.).
Bituminous coal.....	42,417,764	" (of 2,000 lb.).
Pig iron.....	4,144,000	" (of 2,240 lb.).
Lead.....	105,000	"
Copper.....	31,000	"
Quicksilver.....	59,000	flasks (of 76½ lb. avoird.).
Gold.....	\$31,870,000	(=1,541,711 oz.).
Silver.....	\$45,078,000	(=34,865,960 oz.).
Petroleum.....	27,264,000	barrels (of 42 gallons).

"The statistics of other useful minerals and metals show an equally marvelous advance during the past thirty years. The production of pig iron, which in 1852

was 541,000 net tons, in 1861 was 653,000 tons, and in 1871 was 1,708,000 tons. Ten years later, in 1881, we produced no less than 4,144,000 tons, an increase in thirty years of nearly 800 per cent.

"Lead, which appears at 14,400 tons in 1852, varied but little from that figure until the construction of railroads into the argentiferous lead-mining districts of the west about 1870. Eureka, Nevada, Utah, and more recently Colorado, with its Leadville bonanzas, rapidly raised the production from 18,000 tons in 1871 to 47,000 tons in 1873, 75,000 tons in 1877, and 105,000 tons in 1881.

"Our production of copper steadily increased from 1,000 tons in 1852 to 31,000 tons in 1881—the enormous output of that unrivaled mine Calumet and Hecla steadying the production and neutralizing the fluctuations of the lesser mines.

"Quicksilver has shown wide fluctuations, due more to trade combinations than to the condition of the mines. In 1852 the output amounted to 20,000 flasks; but it went as low as 10,000 flasks in 1860, and rose to 53,000 flasks five years later; from this it declined to 15,000 flasks in 1875, though in the following year it grew to 75,000 flasks. Last year we produced 59,000 flasks.

"Gold is the only metal in which our production has been declining. In 1852 it amounted to \$60,000,000; but, with some fluctuations, it has now declined to less than \$32,000,000 annually.

"The production of silver, on the contrary, has largely increased. Commencing in 1859 with \$100,000, it has now attained \$45,000,000. In 1877 only were these figures exceeded, and then only by about \$1,000,000.

"The production of petroleum, that great American industry, has grown with wonderful rapidity. In 1859 it commenced with only 3,000 barrels, and, after an almost uniform increase, it attained last year the enormous figures of 27,000,000 barrels. Scientific investigation has recently raised a note of warning in this industry, asserting the limited area of oil-producing territory and its approaching exhaustion."

The output for the year ended May 31, 1880, is summed up as follows:

	Gold.		Silver.		Total.
	Ounces.	Value.	Ounces.	Value.	Value.
Deep mines.	1,033,974	\$21,374,152	31,717,297	\$41,007,296	\$62,381,448
Placers.	580,767	12,005,511	80,177	103,661	12,109,172
All mines..	1,614,741	\$33,379,663	31,797,474	\$41,110,957	\$74,490,620

The State producing the greatest value is Colorado, viz., \$19,249,172, or gold 130,607 ounces, and silver 12,800,119 ounces; California comes next, having produced \$18,301,828 of bullion, and then Nevada, with \$17,318,909 of bullion.

The greatest gold producer among the States and Territories is California, with 829,676 ounces of gold, half from deep mines and half from placers. Next follows Nevada, with 236,468 ounces of gold, of which only about 1 per cent. came from placer mines; then Dakota, 159,920 ounces of gold, nearly entirely produced by deep mines; and in the fourth rank Colorado, 130,607 ounces, with a placer production of less than 5,000 ounces.

The greatest silver producer is Colorado, with 12,800,119 ounces; then Nevada, 9,614,561 ounces; then Utah, 3,668,365 ounces; Montana, 2,246,938 ounces; and fifthly Arizona, 1,798,920 ounces.

It is useless within the limits of this article to attempt to convey an adequate idea of the enormous mineral resources of the United States. We can merely very briefly allude to some of the principal deposits, which are of commercial value on account of their magnitude, of scientific interest owing to their mode of occurrence, and of technical importance as having led to the introduction of considerable improvements in the arts of mining, milling, and dressing.

Among these may be mentioned the coal and anthracite mines and oil wells of Pennsylvania, the gold and quicksilver mines of California, the silver mines of Nevada, the lead and silver mines of Colorado, and the copper mines of Lake Superior. The articles COAL and GOLD may be referred to for information concerning the occurrence of these minerals and the method of extracting gold by hydraulic mining and improved stamping machinery.

Quicksilver in the form of native mercury and cinnabar occurs in considerable abundance in California, and much of it is found in connection with serpentine, either in the serpentine itself or in sandstone near its junction with serpentine. The most important mines are those of New Almaden in the southern part of the State near San Jose. The deposit at Sulphur Bank in Lake County is of much geological interest. It consists of native sulphur, gypsum, and cinnabar in a decomposed andesitic lava close to an extinct geyser from which boiling water still issues. The top of the bank was worked open-cast for sulphur, and then for sulphur and cinnabar, and now underground mining is carried on in stratified sandstone and shale impregnated with cinnabar and underlying the lava.

Some of the most marvelous silver mines in the world are those upon the Comstock lode in Nevada. The strike is nearly north and south, and the dip about 43° to the east. "The vein matter of the Comstock consists of crushed and decomposed country rock, clay, and quartz." "Up to January 1, 1880, the Comstock had yielded in twenty years about \$325,000,000 worth of bullion. The total length of shafts and galleries is about 250 miles. The number of men employed in the mines in January, 1880, was 2,800, earning average wages of \$4 a day. At the same date 340 men were at work in the amalgamating mills." The heat of the Comstock lode is remarkable. On the 2,700 feet level of the Yellow Jacket mine Mr. Becker found the temperature of the water to be 153° , that of the air 126° ; while the water in the Yellow Jacket shaft at a depth of 3,065 feet has a temperature of 170° Fahr. During the last few years the Comstock lode almost entirely fell off in productiveness. In 1876 the total yield of the Comstock lode was \$38,572,984 (gold, \$18,002,906; silver, \$20,570,078). During the census year ending May 31, 1880, the product of the whole Comstock district, including outlying veins, was \$6,922,330 (gold, \$3,109,156; silver, \$3,813,174), showing a decline of \$31,650,654, or 82.06 per cent., since 1876.

Though the extraction of silver from its ores may be regarded as the business of the metallurgist rather than of the miner, we must not forget to mention that it is to the necessities of the treatment of the Nevada ores that we owe the system of pan amalgamation first developed in that State and practiced since in Colorado.

Another district in Nevada which cannot be passed over in silence is that which contains the Eureka and Richmond mines, which are celebrated, not only for the silver they have produced, but also for the important trial in which the issue hinged upon the definition of the term vein or lode. The bullion produced in the Eureka district from ore raised and treated during the census year ended May 31, 1880 was—gold, 62,893 ounces;

and silver, 2,037,666 ounces; worth altogether \$3,934,621.

The history of Leadville in Colorado seems like a romance when we read of the rapid development of the mines, the creation of a large and important town, the erection of smelting works and the building of railways, under very adverse conditions, in the heart of the Rocky mountains, all within the space of four or five years. It affords additional proof that the miner is the true pioneer of civilization.

The principal deposits of the region are found at or near the junction of the porphyry with the blue limestone, which is the lowest member of the Carboniferous formation. This bed is about 150 or 200 feet thick, and consists of dark blue dolomitic limestone. At the top there are concretions of black chert. The porphyry occurs in intrusive sheets which generally follow the bedding, and almost invariably a white porphyry is found overlying the blue limestone. This porphyry is of Secondary age; it is a white homogeneous-looking rock, composed of quartz and feldspar of even granular texture, in which the porphyritic ingredients, which are accidental rather than essential, are small rectangular crystals of white feldspar, occasional double pyramids of quartz, and fresh hexagonal plates of biotite or black mica. Along the plane of contact with the porphyry the limestone has been transformed, by a process of gradual replacement, into a vein consisting of argentiferous galena, cerussite, and cerargyrite mixed with the hydrous oxides of iron and manganese, chert, granular cavernous quartz, clay, heavy spar, and "Chinese talc," a silicate and sulphate of alumina. The vein seems to have been formed by aqueous solutions, which took up their contents from the neighboring eruptive rocks and brought about the alteration of the limestone as they percolated downward through it. In Carbonate Hill, a gradual passage may be observed from dolomite into earthy oxides of iron and manganese. The masses of workable ore are extremely irregular in shape, size, and distribution. They are often thirty to forty feet thick vertically, and occasionally eighty feet, but only over a small area. The rich ore bodies are commonest in the upper part of the ore-bearing stratum.

The official reports of the director of the United States Mint show that in 1888 the total production in the United States was, of gold, \$33,175,000; of silver, \$59,195,000. During the forty years, 1849–88, inclusive, the total production of gold was \$1,771,516,532; of silver, \$861,124,620; a grand total of \$2,632,631,152.

The most important copper mines of the United States are those on Lake Superior, where the native metal occurs "in veins, in large masses, or scattered more or less uniformly in certain beds which are either amygdaloid or conglomerates." The principal copper-producing districts are in Michigan, where the Portage Lake district, in Houghton county, contains the famous Calumet and Hecla mine, which alone produced 15,837 tons of copper in 1880, or about half the entire output of the United States. The deposit from whence this vast amount of copper was obtained is a bed of conglomerate, generally called a vein, dipping about 38° northwest. It has been worked for a depth of 2,250 feet on the incline. In 1875 the stuff stamped yielded $4\frac{1}{2}$ per cent. of copper.

In conclusion, we will point out that the value of the mining industry in the United States exceeds that of any other country in the world, Mr. Porter estimating it for 1879–1880 at \$360,000,000, and that of Great Britain at \$325,000,000.

MINISTRY. Ever since the introduction of monarchical institutions into England the sovereign has always been surrounded by a select body of confidential advisers

to assist the crown in the government of the country. At no period could a king of England act, according to law, without advice in the public concerns of the kingdom; the institution of the crown of England and the institution of the privy council are coeval. At the era of the Norman Conquest, the king's council, or as it is now called the privy council, was composed of certain select members of the aristocracy and great officers of state, specially summoned by the crown, with whom the sovereign usually advised in matters of state and government. In the earlier stages of English constitutional history the king's councilors, as confidential servants of the monarch, were present at every meeting of parliament in order to advise upon matters judicial in the House of Lords; but in the reign of Richard II. the privy council dissolved its judicial connection with the peers and assumed an independent jurisdiction of its own. It was in the reign of Henry VI. that the king's council first assumed the name of privy council, and it was also during the minority of this sovereign that a select council was gradually emerging from out of the larger body of the privy council, which ultimately resulted in the institution of the modern cabinet. Since the Revolution of 1688, and the development of the system of parliamentary government, the privy council has dwindled into comparative insignificance when contrasted with its original authoritative position. The power once wielded by the privy council is now exercised by that unrecognized select committee of the council which we call the cabinet. The practice of consulting a few confidential advisers instead of the whole privy council had been resorted to by English monarchs from a very early period; but the first mention of the term cabinet council in contradistinction to privy council occurs in the reign of Charles I., when the burden of state affairs was intrusted to the committee of state which Clarendon says was enviously called the "cabinet council." At first government by cabinet was as unpopular as it was irregular. Until the formation of the first parliamentary ministry by William III. the ministers of the king occupied no recognized position in the House of Commons; it was indeed a moot point whether they were entitled to sit at all in the lower chamber, and they were seldom of one mind in the administration of matters of importance. Before the Revolution of 1688 there were ministers, but no ministry in the modern sense of the word; colleague schemed against colleague in the council chamber, and it was no uncommon thing to see ministers opposing one another in parliament upon measures that ought to have been supported by a united cabinet. As the exchange from government by prerogative to government by parliament, consequent upon the Revolution of 1688, developed, and the House of Commons became more and more the center and force of the state, the advantage of having ministers in the legislature to explain and defend the measures and policy of the executive government began gradually to be appreciated. The public authority of the crown being only exercised in acts of administration, or, in other words, through the medium of ministers, it became absolutely necessary that the advisers of the sovereign, who were responsible for every public act of the crown as well as for the general policy they had been called upon to administer, should have seats in both Houses of Parliament. The presence of ministers in the legislature was the natural consequence of the substitution of government by parliament for the order of things that had existed before 1688. Still nearly a century had to elapse before political unanimity in the cabinet was recognized as a political maxim. From the first parliamentary ministry of William III. until the rise of the second Pitt divisions in the cabinet were constantly occurring, and a prime minister had more to

fear from the intrigues of his own colleagues than from the tactics of the opposition. In 1812 an attempt was made to form a ministry consisting of men of opposite political principles, who were invited to accept office, not avowedly as a coalition government, but with an offer to the Whig leaders that their friends should be allowed a majority of one in the cabinet. This offer was declined on the plea that to construct a cabinet on "a system of counteraction was inconsistent with the prosecution of any uniform and beneficial course of policy." From that date it has been an established principle that all cabinets are to be formed on some basis of political union agreed upon by the members composing the same when they accept office together. It is now also distinctly understood that the members of a cabinet are jointly and severally responsible for each other's acts, and that any attempt to separate between a particular minister and his colleagues in such matters is unfair and unconstitutional.

The leading members of an administration constitute the CABINET, (*q.v.*)

During the present century the power of ministers has been greatly extended, and their duties more distinctly marked out. Owing to the development of the system of parliamentary government, much of the authority which formerly belonged to English sovereigns has been delegated to the hands of responsible ministers. As now interpreted, the leading principles of the British constitution are the personal irresponsibility of the sovereign, the responsibility of ministers, and the inquisitorial power of parliament. At the head of affairs is the prime minister, and the difference between theory and practice is curiously exemplified by the post he fills. The office is full of anomalies. Like the cabinet council the prime minister is unknown to the law and the constitution, for legally and according to the fictions of the constitution no one privy councilor has as such any superiority over another, yet practically the premier is the pivot on which the whole administration turns. He is the medium of intercourse between the cabinet and the sovereign; he has to be cognizant of all matters of real importance that take place in the different departments so as to exercise a controlling influence in the cabinet; he is virtually responsible for the disposal of the entire patronage of the crown; he selects his colleagues, and by his resignation of office dissolves the ministry. No prime minister could carry on the government of the country for any length of time who did not possess the confidence of the House of Commons; and royal favor, if it were ever invidiously exercised, would ultimately have to yield to a regard for the public interests. As a general rule the prime minister holds the office of first lord of the treasury, either alone or in connection with that of chancellor of the exchequer.

In the United States the members of the cabinet are the heads of various departments of state, nominated by the president and confirmed by the Senate. The cabinet officers are the secretary of state (foreign affairs), secretary of the treasury, secretary of war, secretary of the navy, secretary of the interior, postmaster-general, attorney-general, and secretary of agriculture. Unlike the English ministers, who must have a seat in one or other branch of the legislature, the members of the president's cabinet cannot sit in either the Senate or the House of Representatives, and if they are members of either resign on being called to the cabinet. Strictly speaking, the cabinet officers are only chiefs of departments and as such they are legally recognized. In effect they have a position nearly analogous to that of their English compeers. The system of a cabinet of heads of departments acting under the

leadership of some one distinguished member, and, as a rule, amenable to the popular representative house is common to all constitutionally-governed countries.

MINK. The genus *Putorius*, belonging to the family *Mustelidae* or weasel-like animals, contains a few species called minks, distinguished from the rest by slight structural modifications, and especially by semi-aquatic habits. They form the subgenus *Lutreola* of Wagner, the genus *Vison* of Gray. They are distinguished from the polecats, stoats, and weasels, which constitute the remainder of the group, by the facial part of the skull being narrower and more approaching in form that of the Martens, by the premolar teeth (especially the first of the upper jaw) being larger, by the toes being partially webbed, and by the absence of hair in the intervals between the naked pads of the soles of the feet. The two best-known species, so much alike in size, form, color, and habits that although they are widely separated geographically some zoölogists question their specific distinction, are *P. lutreola*, the *Nörz* or *Sumpftotter* (marsh-otter) of eastern Europe, and *P. vison*, the Mink of North America. The former inhabits Finland, Poland, and the greater part of Russia, though not found east of the Ural mountains. The latter is found in places which suit its habits throughout the whole of North America. In size it much resembles the English polecat—the length of the head and body being usually from fifteen to eighteen inches, that of the tail to the end of the hair about nine inches. The female is considerably smaller than the male. The tail is bushy, but tapering at the end. The ears are small, low, rounded, and scarcely project beyond the adjacent fur. The pelage consists of a dense, soft, matted under fur, mixed with long, stiff, lustrous hairs on all parts of the body and tail. The gloss is greatest on the upper parts; on the tail the bristly hairs predominate. Northern specimens have the finest and most glistening pelage; in those from southern regions there is less difference between the under and over fur, and the whole pelage is coarser and harsher. In color, different specimens present a considerable range of variation, but the animal is ordinarily of a rich dark brown, paler below than on the general upper parts; but the back is usually the darkest, and the tail is nearly black. The under jaw, from the chin about as far back as the angle of the mouth, is generally white. In the European Mink the upper lip is also white, but, as this occasionally occurs in American specimens, it fails as an absolutely distinguishing character. Besides the white on the chin, there are often other irregular white patches on the under parts of the body. In very rare instances the tail is tipped with white. The fur, like that of most of the animals of the group to which it belongs, is an important article of commerce.

The principal characteristic of the mink in comparison with its congeners is its amphibious mode of life. It is to the water what the other weasels are to the land, or martens to the trees, being as essentially aquatic in its habits as the otter, beaver or musk-rat, and spending perhaps more of its time in the water than it does on land. It swims with most of the body submerged, and dives with perfect ease, remaining long without coming to the surface to breathe. It makes its nest in burrows in the banks of streams, breeding once a year about the month of April, and producing five or six young at a birth. Its food consists of frogs, fish, freshwater molluscs and crustaceans, as well as mice, rats, musk-rats, rabbits, and small birds. In common with the other animals of the genus, it has a very peculiar and disagreeable effluvium, which is more powerful, penetrating, and lasting than that of any animal of the country except the skunk. It also possesses the courage,

ferocity, and tenacity of life of its allies. When taken young, however, it can be readily tamed, and lately minks have been extensively bred in captivity in America both for the sake of their fur and for the purpose of using them in like manner as ferrets in England, to clear buildings of rats.

MINNEAPOLIS, by reason of her rapid growth, wonderful resources, and the unparalleled enterprise of her citizens is rightfully and universally conceded to be one of the phenomenal cities of the United States. The government census shows that in 1880 there were thirty-seven cities in the United States with larger populations than Minneapolis. The census made in 1890 shows wonderful progress, placing Minneapolis nineteenth in order of population among American cities. Minneapolis lies on both banks of the Mississippi river at the Falls of St. Anthony, is the county seat of Hennepin county, and the chief city of the State of Minnesota. Although the city is at the nominal head of navigation of the Mississippi river, only two lower-river steamboats have landed at the Minneapolis docks for eighteen years. The government steamer *Ada* landed May 2, 1890, and reported a depth of water sufficient to allow any of the steamboats landing at St. Paul to proceed to Minneapolis. Louis Hennepin in 1680 visited the Falls, and gave them their name, after one of his saints, Anthony of Padua. He made a few measurements and is supposed to have been the first white man to visit the site of the present city of Minneapolis. The name Minneapolis is a hybrid—"Minne" being Sioux for water and "polis" Greek for city.

At the beginning of the present century surveys were made by the United States Government, and after Fort Snelling was established at the mouth of the Minnesota river some of the officers of the fort came to the Falls of St. Anthony, entered land, and took up claims. The first real estate transfer was made in 1838, and during that year two buildings were erected. In 1845 the population of Minneapolis numbered fifty persons, and that year the first house with a shingle roof was built. In 1848 a saw-mill gave the initial impetus to Minneapolis' industries. In 1849 when the territory of Minnesota was organized, Minneapolis made a struggle for the capitol, but secured the State University instead. A newspaper was established in 1851. The original city was on the east bank of the river and was not Minneapolis, but St. Anthony. It was incorporated in 1860, and soon found an ambitious rival in the town on the west bank of the river. Minneapolis was incorporated under a town government in 1858, and as a city in 1867. In 1872 St. Anthony was incorporated in the Minneapolis municipality. Since that time the growth of Minneapolis has challenged the attention of the world. The city now covers an area of fifty-three square miles, and is situated on a level plateau with rolling prairie on all sides.

Population.—The population of Minneapolis in 1850 was 2,200; in 1860, 5,826; in 1870, 13,066; in 1880, government census, 46,887; in 1885, State census, 115,050. The United States census of 1890 announced the population as 164,738, thus showing the remarkable increase of 117,893 over the figures given in the census of 1880.

The Water Power.—The utilization of the great water power of the Falls of St. Anthony for manufacturing purposes, has been the foundation for the unparalleled prosperity of the city of Minneapolis. The water power is vested in two corporations, the Minneapolis Mill Company, and the St. Anthony Falls Water Power Company. There is within the city limits a fall of seventy feet, producing 35,000 horse power. Improve-

ments already undertaken, in the form of dams and lower tail races will add 12,000 horse power, which is to be utilized in the generation and transmission of electricity for manufacturing purposes.

The Mississippi here flows over a limestone bed resting upon a friable white sandstone; hence erosion is rapid, and the river banks show that the falls have receded from a position at the mouth of the Minnesota river. In 1851 ninety feet of the limestone gave way at once; and, as the rock bed extends but 1,200 feet above the present site of the falls, the destruction of the water-power was threatened. This has been averted by the construction of an apron or inclined plane of timber, with heavy cribwork at the bottom, and the building of a concrete wall in the bed of sandstone behind the falls and underneath the channel of the river. For this work the United States Government appropriated \$550,000, and the citizens of Minneapolis contributed \$334,500.

Minneapolis Manufactories.—Minneapolis is pre-eminently the "Flour City" of the world. Here are located the two largest flour mills on the globe; the Pillsbury "A" and the Washburn "A," their combined daily capacity being 11,350 barrels. The daily capacity of the twenty-four flour mills in the city is 37,850 barrels. The flour manufactured in Minneapolis and exported during the past ten years is as follows:

YEAR.	BARRELS MANUFACTURED.	BARRELS EXPORTED.
1880	2,051,840	769,442
1881	3,142,972	1,181,322
1882	3,175,910	1,201,631
1883	4,046,220	1,343,105
1884	5,317,672	1,805,876
1885	5,221,243	1,834,544
1886	6,168,000	2,288,500
1887	6,574,900	2,650,000
1888	7,056,680	2,197,640
1889	6,088,865	1,953,815

AVERAGE WHOLESALE PRICE OF FLOUR PER YEAR FOR EIGHT YEARS.

	1882	1883	1884	1885	1886	1887	1888	1889
Fancy.....	\$7.95	\$6.75	\$5.35	\$4.91	\$4.37	\$4.26	\$4.87	\$5.27
Baker's.....	6.12½	5.00	3.90	3.54	3.29	3.35	3.50	3.39½

Nearly all the money paid for grain in the interior is sent from Minneapolis by elevator companies and millers. During 1888 37,660,355 bushels of wheat were received and 11,707,640 bushels of wheat and 5,696,586 barrels of flour shipped from Minneapolis. The elevator capacity of Minneapolis, not including the storage capacity of the mills and mill elevators, is 15,415,000 bushels. The city is the greatest primary wheat market in the world. 41,734,095 bushels of wheat were received and 12,877,370 bushels shipped from Minneapolis in 1889, as compared with 15,973,285 bushels received and 10,916,604 bushels shipped from New York, which ranked next.

Ranking next to flour in importance is the lumber output of Minneapolis. Logs are floated down the Mississippi and its tributaries from the pineries of Northern Minnesota. The cut of lumber for ten years has been as follows: 1880, 195,452,200 feet; 1881, 230,403,800 feet; 1882, 312,239,800 feet; 1883, 278,716,480 feet; 1884, 300,724,373 feet; 1885, 313,998,166 feet; 1886, 267,196,519 feet; 1887, 220,822,974 feet; 1888, 337,663,301 feet; 1889, 275,855,648 feet.

The manufacture of furniture and agricultural imple-

ments is also a leading industry. The aggregate value of miscellaneous articles manufactured in Minneapolis for ten years has been as follows: 1880, \$10,333,000; 1881, \$14,872,000; 1882, \$15,727,000; 1883, \$24,002,000; 1884, \$25,627,000; 1885, \$27,327,000; 1886, \$35,320,000; 1887, \$40,000,000; 1888, \$46,470,000; 1889, \$48,384,000.

Jobbing Trade.—The great northern empire, lying between the great lakes and the Pacific Ocean, is naturally tributary to Minneapolis. There is no city so large as Minneapolis between Chicago and the Pacific coast. The country that relies upon Minneapolis for its wholesale supplies is rich in agriculture, mining, timber, and stock raising. The growth of the jobbing trade since 1880 is represented as follows: 1880, 42,745,620; 1881, 83,501,984; 1882, 97,376,000; 1883, 115,558,000; 1884, 127,381,462; 1885, 138,000,000; 1886, 155,341,000; 1887, 156,650,000; 1888, 187,696,000; 1889, 185,048,601.

Real Estate and Building.—In 1880, 3,161 transfers of realty were recorded, with an aggregate consideration of \$4,608,017; in 1883, 10,220 transfers, \$28,308,550; in 1886, 14,493 transfers, \$38,319,062; in 1889, 10,353 transfers, \$34,552,683. In 1880, 628 building permits were issued for structures to cost \$2,080,600; in 1883, 3,369 permits, \$10,533,000; in 1886, 4,301 permits, \$11,707,202; in 1889, 4,386 permits, \$13,139,927. In 1888 building permits were taken out for the new court house and city hall and the Guaranty Loan building, aggregating \$3,250,000. The first named building is now in process of construction. The business blocks of Minneapolis are all substantial stone, brick, or iron and glass structures. During 1889 twenty-one permits were taken out for structures to cost between \$40,000 and \$100,000.

Receipts and Shipments.—During the year 1889 the receipts and shipments of principal articles of merchandise at Minneapolis were as follows:

	Received.	Shipped.
Wheat, bushels.....	41,734,095	12,577,370
Oats, "	1,971,000	486,000
Corn, "	2,161,800	456,600
Barley, "	333,600	255,600
Flour, pounds.....	64,719	6,071,171
Mill stuff, tons.....	5,236	196,627
Lumber, feet.....	57,660,000	179,242,000
Merchandise, pounds.....	361,852,932	399,244,045
Barrel stock, cars.....	1,426	65
Coal, tons.....	204,133	8,761
Live stock, head.....	50,800	36,950
Total car lots... ..	162,472	149,060

Railroad Facilities.—The position of Minneapolis as a jobbing and grain center is due to her excellent railroad facilities. There are six all-rail competing lines to the seaboard *via* Chicago. There are six lines connecting with the head of Lake Superior. To the Pacific coast there are three competing lines north of the Union Pacific. The total mileage of roads centering in Minneapolis is as follows: Chicago and North-Western system, 7,025; Burlington system, 6,643; Chicago, Milwaukee and St. Paul, 5,655; Chicago, Rock Island and Pacific system, 4,902; Northern Pacific system, 3,465; Great Northern system, 3,249; Chicago, St. Paul and Kansas City, 858; Minneapolis, St. Paul and Ste. Marie, 787; Wisconsin Central, 768; St. Paul and Duluth, 231; total, 33,583.

City Government and Finances.—The city government consists of a mayor, police commission, and a common council of thirty-nine members. There are thirteen city wards. The councilmen are elected for two and four year terms at elections held every two years.

The total bonded debt of the city on January 1, 1890, was \$6,486,500. The limit of bonded indebtedness is fixed at 5 per cent. on the taxable valuation of all property. The city is restricted from incurring any floating indebtedness. The average rate of interest upon the entire bonded debt of the city is 4.73 per cent. The value of all property owned by the city of Minneapolis, January 1, 1890, was as follows; City property, \$8,061,161; board of education, \$2,099,300; parks, \$3,918,400; public library building, \$320,654; court house and city hall (new and partially completed), \$761,911. Total \$15,161,426. The receipts from water rentals for the year 1889 were, \$157,514; from licenses, \$266,170. The city possesses sixty-four miles of sewers, twenty-five miles of paved street, and 142 miles of water mains. There are three pumping stations with a combined pumping capacity of 73,000,000 gallons of water daily.

Assessed Valuation and Tax Levy.—The assessed valuation of Minneapolis as equalized by the State board of equalization in 1889 was: Lands, \$10,096,299; lots, \$98,474,696; personal, \$20,024,429; total \$128,595,424. The assessed value of real estate and personal property, and tax levy for each year, from 1875 to 1890 is as follows:

YEARS.	Total Real Estate and Personal.	Rate, Mills.
1875.....	\$21,834,079	20.65
1876.....	20,770,416	22.45
1877.....	20,878,502	23.02
1878.....	20,862,558	22.02
1879.....	23,415,733	13.90
1880.....	28,013,315	16.10
1881.....	31,188,486	19.10
1882.....	40,702,044	18.20
1883.....	53,901,815	20.80
1884.....	74,310,711	16.00
1885.....	77,468,267	20.00
1886.....	99,560,468	17.10
1887.....	107,872,000	20.06
1888.....	127,069,756	18.06
1889.....	128,595,424	21.40

Postoffice Gross Receipts.—The Minneapolis postoffice during 1889 employed seventy-four letter-carriers, who handled 74,078,778 pieces of mail. The gross receipts of the Minneapolis postoffice each fifth year since the establishment of the office in 1854 were as follows:

1854.....	\$138.71
1859.....	2,234.05
1864.....	4,467.33
1869.....	18,882.64
1874.....	40,670.90
1879.....	63,880.45
1884.....	178,218.97
1889.....	309,400.00

Public Schools.—The public schools of Minneapolis number thirty-seven, with sittings for 17,850 pupils. Only two of the school buildings are rented. The teachers employed are 466, and the whole number of pupils enrolled during 1888-90, 21,196. In the evening schools 2,545 pupils are enrolled, and in the High schools 1,166. At the State University in East Minneapolis 1,003 students were in attendance April 4, 1890.

Banks.—There were on May 1, 1890, twenty-two banks with an aggregate capital of \$8,870,000. Besides the banks there are four loan and trust companies with an aggregate capital of \$2,500,000. The bank clearances of the city in 1883 were \$87,508,000; in 1885, \$125,477,478; in 1887, \$194,777,533; in 1889, \$240,659,504, an increase of 11 per cent. over the year 1888.

Churches, Library, and Hotels.—Minneapolis has 155

church and mission societies, the value of whose property actually used for church purposes aggregates \$3,668,000. The amount expended upon improvements to this property in 1889 was \$210,460. The membership of Minneapolis churches is 31,626. The Baptists and Methodists have twenty-three societies each, the Congregationalists nineteen. The Catholic church has a membership of 4,500. A public library has been erected at a cost of \$318,000. The library numbers 40,000 volumes, and has an annual income of \$75,000. There are nine leading hotels.

Health, Police, and Fire Departments.—The mortuary rate was eleven per thousand during the year 1889. The police department consists of 200 men. The aggregate expense of the department for the year 1889 was \$193,521; 6,277 arrests were made during the year, of which 2,697 were for drunkenness. The French system of identification of criminals is used. Saloons are restricted within certain defined limits within the business center.

The fire department of Minneapolis numbers 204 officers and men, occupying eighteen engine houses. The apparatus consists of eleven steamers, fifteen hose carts, six chemicals, six hook and ladder trucks, 114 horses, supply, fuel, exercising wagons, etc. The number of fire hydrants in the city is 1,177. The pumps located four miles above the center of the city furnish 15,000,000 gallons of Mississippi river water for fire department and domestic use. There are 100 fire alarm boxes. The expense of the department for 1889 was \$202,841. The fire loss for 1889 was \$272,815; insurance, \$1,702,304. Four hundred and eighty-four alarms were responded to during the year.

Parks.—The parks of Minneapolis comprise 1,155 acres and are valued at \$3,918,400. In connection with these are nineteen and a half miles of boulevards and park ways. This property was acquired mainly by direct purchase at about one-fifth of its present value. It costs to maintain this system about \$25,000 a year. Lake Harriet Park covers 415 acres, and the park surrounding the Falls of Minnehaha, made famous by the poet Longfellow, 173 acres.

Street Railways.—There are eighty-five miles of street railroad tracks in Minneapolis, owned and operated by the Minneapolis Street Railway Company. Electricity was substituted for horse power on the Fourth avenue line in December, 1889, and on May 10, 1890, a force of 2,000 men was employed in changing all other lines in the city so that they can be operated by electric power; 430 cars are in use, and 730 men are regularly employed. The fare on the line to St. Paul, under construction May 1st, will be ten cents. Fares on all Minneapolis lines are five cents, and transfer checks are issued from one line to another, and from the Minneapolis to the St. Paul systems.

The city of Minneapolis and the sister city St. Paul together form the marvel of the Northwest—the far-famed “Twin Cities.” They lie at a distance of ten miles from each other, and are in interest and importance, really on a common basis, although there exists between the two places a spirited friendly rivalry. It is not too much to predict that, if the rate of growth heretofore experienced by each of these rapidly increasing cities is maintained, it will not be the work of many years to cover the entire space between the two towns with buildings and population, and make of the two one united city. They are now to all intents and purposes one city—the means of transportation between them being as available as are the street railways running from one section to another in each separate city. Many of the residents of one city are employed in business in the other.

MINNESOTA, one of the northwestern States of the American Union, extending from Iowa to the British possessions, and from Wisconsin and Lake Superior on the east to North and South Dakota on the west. Its area, including half of the lakes, straits, and rivers along its boundaries, except Rainy Lake and Lake of the Woods, amounts to 83,365 square miles.

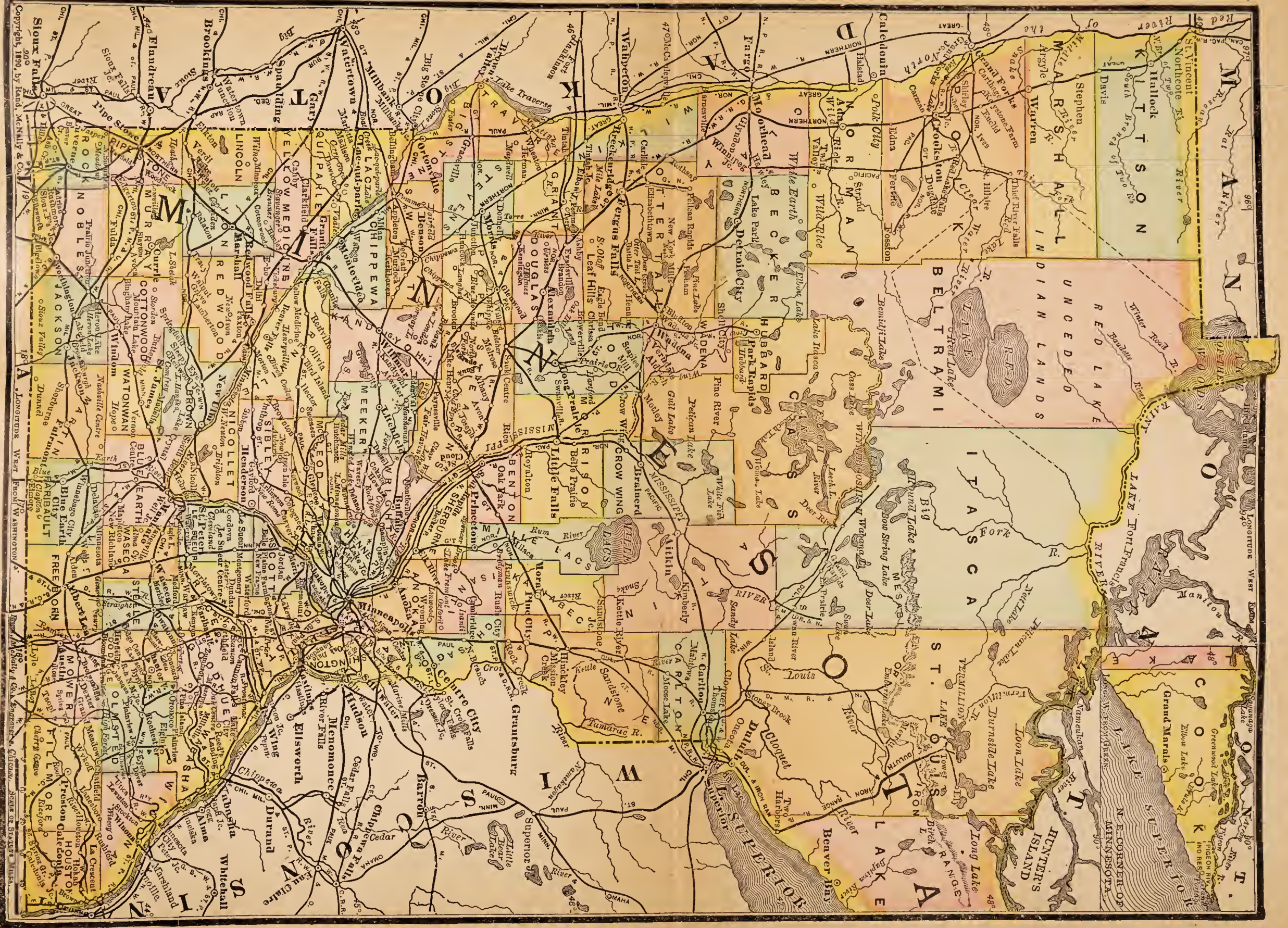
The surface of Minnesota is diversified by few elevations of any great height. In general it is an undulating plain, breaking in some sections into rolling prairie, and traversed by belts of timber. It has an average elevation above sea-level of about 1,000 feet. The watershed of the north (which determines the course of the three great continental river systems) and that of the west are not ridges or hills, but elevations whose inclination is almost insensible. The southern and central portions of the State are chiefly rolling prairie, the upper part of which is crossed from northwest to southeast by the forest belt known as the Big Woods—a stretch of deciduous forest trees with an area of about 5,000 square miles. North of the forty-seventh parallel, the great Minnesota pine belt reaches from Lake Superior to the confines of the Red River valley, including the region of the headwaters of the Mississippi and its upper tributaries, as well as those of the Superior streams. North of the pine region there is but a stunted growth of tamarack and dwarf pine. In the northeast are found the rugged elevations of the granite uplift of the shores of Lake Superior, rising to a considerable height; while in the northwest the surface slopes away to the level prairie reaches of the Red River valley. The surface elevation of the State varies from 800 to 2,000 feet above sea-level. A short line of hills in the northeast reaches the latter altitude, while only the valleys of the Red River, the Mississippi, and the Minnesota fall below the former.

The great central zone, from Lake Superior to the southwestern extremity of the State, is occupied by granitic and metamorphic rocks, succeeded, in the southeast, by narrower bands of later formation. Within the great Azoic area lies the central watershed of the continent, from which the St. Lawrence system sends its waters toward the Atlantic, the Mississippi toward the Gulf of Mexico, and the Red River of the North to Hudson's Bay. These primordial rocks carry back the geologic history of Minnesota to pre-Silurian times. They form in the northeast, in the neighborhood of Lake Superior, an extremely rough and hilly country, but as they reach the central and southwestern portions of the State they for the most part disappear beneath the surface drift. This central belt is succeeded, on the south and east, by a stretch of sandstone, partially the true red Potsdam and partially a similar but lighter-colored stratum, which some have proposed to designate the St. Croix sandstone. Isolated beds of sandstone are found in various parts of the State. The northwestern corner, stretching east from the Red River valley, is believed to be Cretaceous; but the great depth of drift and alluvium, disturbed by no large rivers, prevents a positive conclusion. The Lower Magnesian limestone underlies the extreme southeastern portion of the State, and extends along the west side of the Mississippi to a point a little below St. Paul; thence it takes a course almost semicircular, and finally passes out of the State at the southwestern boundary. The Trenton limestone occupies a large field in the south and southeast; it comes to the surface in long irregular bands, and an island of it underlies the cities of Minneapolis and St. Paul with the adjacent districts. The Galena limestone, the Masquoketa shales, the Niagara limestone, and the rocks of the Devonian age in turn prevail in the other counties of the south and east;

while the existence of the St. Peter sandstone would scarcely be known but for its outcropping along the bluffs of the Mississippi, and at the famous waterfall of Minnehaha. From these various formations numerous kinds of stone valuable for building purposes are obtained. The gray granite of St. Cloud is extremely hard and enduring. The Lower Magnesian furnishes two especially handsome building stones—the pink limestone known as Kasota stone, and the cream-colored stone of Red Wing, both easily worked, and hardening by exposure to atmospheric changes. Naturally, from its location underneath the principal cities of the State, the Trenton limestone is the most widely used. Sand suitable for glass-making, and argillaceous deposits abound. The clays which make up so large a portion of the surface drift of the State are almost wholly of glacial origin. Overlying the deposits of sand, gravel, bowlders, and clay is, in most portions of the State, a sandy loam, very finely divided, rich in organic matter, deep brown or black in color, and of the greatest fertility. It is this soil which has given to the State its reputation for productiveness. Its depth varies from two to five feet in various parts of the State, and it is excellent in quality, rich as well in organic matter as in those mineral salts which give rapidity to the growth of plants, while it has that durability which enables it to sustain a long succession of crops.

The State holds a unique place with reference to the great water systems of the continent. The Mississippi takes its rise in Lake Itasca, north of the center of the State. Before it leaves the State limits it becomes a great river, half a mile wide, and from five to twenty feet deep. It drains with its tributaries all the southern and central portions and a large area of the northern part of the State. It is navigable as far as St. Paul, and at Minneapolis the falls of St. Anthony afford unrivaled facilities for manufacturing. Of the many affluents of the Mississippi the most important is the Minnesota, which, after a course of about 440 miles, flows into the main stream at Fort Snelling, three miles above St. Paul. The source of the Minnesota is but one mile from Lake Traverse, the origin of the Red river of the North, and it is navigable during the high-water season for about 238 miles. Its principal tributaries are the Blue Earth, Chippewa, Redwood, Lac qui Parle, and Pomme de Terre. The Red river system drains the northwestern part of the State, and its waters finally pass into Hudson's Bay, as also do those from the country drained by streams flowing to the Rainy Lake river and the lakes along the northern boundary line. East of this lies the region tributary to Lake Superior and the St. Lawrence system. This comprises an area within the State estimated at 9,000 square miles. Its principal river is the St. Louis. There are altogether about 2,796 miles of navigable water in Minnesota.

The number of lakes is estimated at seven thousand. They are of all sizes, and are found chiefly in the northern two-thirds of the State. They have been classified geologically into glacial or drift lakes fluviatile or river lakes, occupying basins on river courses, and lakes having rock basins either scooped out by the action of glaciers or formed by the relative position of different geological formations. By far the greater number give evidence of glacial action in their origin. They abound over the region most deeply covered by the surface drift, and are especially prevalent in morainic districts, forming the southern fringe of the lacustrine area of North America. With the melting of the ice-sheet which once overspread Minnesota its innumerable lakes came into existence; and the gentle acclivity of its slopes, precluding rapid erosive action, has tended



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to give permanence to the depressions constituting their basins. The census returns give 4,160 square miles of water service within the State. Most of the lakes are exceedingly picturesque in their surroundings. Forests skirt their shores, which are seldom marshy; and their waters, abounding in various kinds of fish, are clear and cool. Besides the sanitary advantages afforded by the lakes, as supplying places for recreation and delightful summer resorts, they effect the climate to some extent, tempering the extremes commonly experienced in northern latitudes. The fact that many of the lakes are gradually drying up must be explained by agricultural operations. The largest lakes, exclusive of Superior, lying wholly or in part in Minnesota are as follows: Lake of the Woods, 612 square miles; Red, 342; Mille Lacs, 198; Leech, 194; Rainy, 146; Winnibigoshish, 78, and Vermilion, 63.

The flora and fauna present no marked differences from those of other states in the same latitude. In a partial list of the birds of Minnesota, two hundred and eight-one species are enumerated. Of winter birds fifty-two species have been classified, twenty-three of them being permanent residents.

The State lies so far north as to have a low mean annual temperature, and so far inland as to have the characteristic continental climate. Its elevation above sea-level gives an agreeable rarefaction to the atmosphere, and makes the prevalence of fogs and damp weather unknown. Between June and January there is an annual variation from the summer heat of southern Ohio to the winter cold of Montreal. The winter, usually commencing in November, and continuing till near the end of March, is not a period of intense continued cold, but is subject to considerable variations. As a rule, the comparative dryness of the atmosphere neutralizes the severest effect of excessive cold. The snowfall is extremely light during most of the winter, but as spring approaches precipitation becomes greater, and there are frequently heavy snowfalls in February and March. The change from winter to summer is rapid, vegetation sometimes seeming to leap into full and active growth within the space of a few weeks. The summer months bring days of intense heat, but, with comparatively rare exceptions, the nights are deliciously cool. Hot days and cool nights make the ideal weather for a good wheat crop; and the forcing heats of summer produce in luxuriant growth the vegetable life which belongs to the Middle States. The Smithsonian chart assigns to Minnesota an average temperature for the hottest week in summer of from 85° to 90°, and for the coldest week in winter from 10° to 20° below zero. The mean annual average, for all below 47° of latitude, it gives as 40°. Observations at St. Paul, extending over a period of more than thirty-five years, show the following mean temperatures: spring, 45.6°; summer, 70.6°; autumn, 40.9°; winter, 16.1°; average, 44.6°. The average annual rainfall is about 25.5 inches. While this is not large, it is so distributed as best to subserve the purposes of vegetable growth. No moisture is lost in superfluous spring and autumn rains, or in the cold and non-producing part of the year, the precipitation, which in winter is less than two inches, increasing to about twelve for the summer. To the season of vegetable growth belong 70 per cent. of the yearly measures of heat, 76 per cent. of the rainfall, and 76 per cent. of the atmospheric humidity. The prevailing winds are from the south or south-east. It is evident that the causes which mitigate the actual severity of the climate as felt, which produce so large a number of clear days, and which forbid the continued presence of a large amount of moisture in the atmosphere, are those which render a climate health-

ful in the highest degree. Minnesota has been for many years a favorite resort for invalids. The curative properties of its climate are especially marked in the case of pulmonary complaints.

The leading industry of the State is agriculture. The character of the surface soil varies in different parts of the State with the character of the underlying strata. The fertile land comprises about three-fourths of the entire area of the State. The drift soil proper of the south and center, including the Minnesota valley and the greater part of that of the Mississippi, contains silica and calcareous matter, and is interspersed with alluvial river bottoms. The limestone soil, in which there is a large calcareous element, lies chiefly on the western slope of the Mississippi. The Red River valley consists of an argillaceous mold, rich in organic deposits. Around Lake Superior, wherever arable land is to be found, it is marked by a rich trap soil. North of the central fertile area, and in the neighborhood of the sources of the Mississippi, is much swampy land, susceptible of easy drainage, with a large tract of sand and other drift detritus, unfavorable to production. Maize and potatoes flourish, and the uplands, which support hardwood ridges, are suited to general agriculture. To the extreme north the surface, while indicating mineral wealth, is utterly unfit, except in occasional isolated areas, for purposes of tillage.

Wheat has hitherto been the staple product of the State. Soil and climate are such as to insure a large average yield, while the superior quality of the grain has given it a wide reputation. The other cereals are also cultivated with success. The tendency to diversify agriculture, especially in the southern part of the State, has been stimulated by several partial failures of the wheat crop, the locust invasions, and the competition of the farther northwest. The area of the state includes 39,791,265 acres surveyed, 10,968,575 acres not surveyed, and 2,700,000 acres of lake surface.

The official returns for 1889 show the principal field products as follows:

	Acreage.	Total Yield Bushels.	Av'ge Yield Per Acre.
Wheat.....	2,921,437	46,660,583	15.90
Oats.....	1,394,555	48,253,799	34.60
Corn.....	688,622	22,115,769	32.10
Barley.....	332,017	9,105,209	7.40
Rye.....	31,534	579,750	18.30
Buckwheat.....	8,558	147,917	17.20
Potatoes.....	80,320	6,444,137	18.20
Beans.....	2,568	32,717	12.70
Sugar Cane—gallons...	4,060	249,198	.....
Cultivated Hay—tons...	410,474	541,528	.....
Flax Seed—bushels....	157,540	1,647,622	10.40
Other Products.....	102,447	.....	.....
Total Acres.....	6,134,132		

Other agricultural products were, wild hay, tons, 1,623,749; timothy seed, bushels, 234,228; clover seed, bushels, 39,039; apples, bushels, 77,407; grapes, pounds, 661,109; tobacco, pounds, 13,949.

It is estimated that the aggregate of lands yet undisposed of, three-fourths of which may be profitably cultivated, is nearly 20,000,000 acres, exclusive of the lands belonging to the State. White Earth Indian reservation has thirty-six townships of prairie and timber land; and Red Lake reservation contains 3,200,000 acres.

Minnesota is still rich in timber, white pine being the most valuable forest product. There is also a considerable quantity of hardwood yet available, although great inroads have been made upon the natural growth and there has been much wastefulness in the operation of marketing the production.

Every encouragement is afforded, both by the railway corporations and by the State, to tree-planting on the prairies. A quarter section is given to anyone who will plant and keep in good condition forty acres of timber for eight years. In one year there were planted 25,331 acres of trees, exclusive of those bordering highways and the windbreaks along the railroad lines.

The manufactures of Minnesota are yet in their infancy. The abundant water-power of the State, its proximity to the coal-fields of Iowa, its superior transportation facilities, and the large demand for manufactured commodities are, however, rapidly developing this branch of industry. The most important industries are the manufacture of flour and that of lumber. The former naturally established itself in a State of immense wheat yield and abundant water-power. It received its greatest stimulus from the invention and adoption of the middlings purifying process, which produces the highest grade of flour, and to which the hard spring wheat of Minnesota is especially adapted. Among other manufacturing industries actively prosecuted are the making of brick, pottery, stoneware, and agricultural implements, and also meat-packing.

The geographical position of Minnesota gives it extensive commercial interests. Two continental waterways terminate within the State. The Mississippi affords continuous navigation to European ports during eight months of the year. From Duluth numerous lines of vessels traverse the chain of great lakes, and transport the products of the west to the eastern seaboard. Three great transcontinental railway lines are connected more or less directly with the railroad system of the State. Twelve lines of railway from every part of Minnesota converge at the contiguous cities of St. Paul and Minneapolis, and three great trunk lines from these centers to Chicago secure the advantages of a lively competition.

The number of miles of railroad in operation June 30, 1888, was 5,042. The capital stock, bonds, and debt of all the railroads in the State was \$206,418,049, and their net income was \$10,420,516. During the year 10,443,230 passengers were carried, and 11,987,995 tons of freight were moved.

On June 30, 1888, there were sixty-one banks operating under State charters, their total resources being \$23,459,426. The fifty-six national banks had a capital of \$13,970,000 and a surplus of \$2,511,562. Their resources were \$53,545,163. The seven State savings banks had resources amounting to \$4,242,891, and the four loan and trust companies represented \$2,221,664.

The common school system is supported by land grants, a local tax, and a State tax. The superintendent of instruction is appointed by the governor. County superintendents are chosen by popular vote. Common school districts have boards of three trustees each. Six directors are appointed for independent districts. The permanent fund in 1889 was \$4,814,655. The State university, located at Minneapolis, is governed by a board of regents, consisting of the governor of the State, the superintendent of public instruction, the president of the university, and six others; both sexes are admitted, and tuition is free. Forty-two academies and six colleges are sustained by denominational or private enterprise.

The enrollment in the public schools in 1890 was 280,960, and the average daily attendance was 127,025. The male teachers numbered 2,114, and the females 6,733. The expenditures for school purposes were \$3,496,282. There are four normal schools supported by the State, and schools for the deaf, blind, and feeble minded.

The departments of government are, as in all the States, the legislative, the executive, and the judicial. The State contains eighty-three counties. From these are elected by districts forty-seven senators and one hundred and three members of the House of Representatives. The State officers are a governor, lieutenant-governor, secretary of state, treasurer, auditor, and attorney-general, all elected by the people. The term of office is two years. The governor has power to veto separate items of a money bill. The judiciary is elective, and the term of office seven years. The State requirements for citizenship are residence in the United States one year, in the State four months, and in the election district ten days preceding an election. Women are allowed to vote for school officers and upon questions relating to the management of schools, and are also eligible to such offices. No county can contain more than 400 square miles. The legislature meets biennially. Extra sessions may be called, but no session can exceed sixty days in length. Under the last apportionment the State is entitled to five representatives in the national Congress.

The report of the State treasurer for the fiscal year ending July 31, 1890, showed that \$3,940,064 was received. The expenditures were \$3,407,983, leaving a balance of \$1,638,223 in the treasury. The bonded debt consists of \$3,965,000 railroad adjustment bonds, and \$400,000 State revenue bonds. The general school fund receipts for the year were \$890,032, the disbursements \$793,267; balance on hand July 31, 1890, \$688,589, including the large balance brought forward from the previous year.

The population of the State was 6,077 at the census of 1850, 172,023 in 1860, 439,706 in 1870, and 780,773 (419,149 males, and 361,624 females) in 1880. The State census of 1885 showed that of the 1,117,798 inhabitants then recorded, 687,120 were native born. There were 45,473 Canadians, 31,801 Irish, 112,926 Germans, 80,735 Swedes, 92,428 Norwegians, 11,785 Danes. The population in 1890 is 1,301,826. The most important cities are St. Paul, the capital, Minneapolis, Winona, and Stillwater.

Missionary efforts and the trading spirit first induced white men to venture as far into the unexplored northwest as the boundaries of what is now the State of Minnesota. The earliest accounts of its natural features and native tribes appear in the Jesuit writings. The "Relations" of 1670-71 allude to the Sioux or Dakotas. In 1678 a company was formed for trading with this tribe. Du Luth was leader of this expedition, and later on went from Lake Superior to the Mississippi by canoe. But the first published account is that of Louis Hennepin, a Recollect monk, who, in 1680, visited the falls of St. Anthony, and gave them their name, from that of his patron saint. For a century the only visitors of the wild region were a few missionaries, and a number of fur traders who found the profit of the journey to more than counter-balance its perils and hardships. To the latter class belong Perrot, who reached the Mississippi by way of the Fox and Wisconsin in 1684, and founded at Lake Pepin the first trading post in the State, and Le Sueur, a Canadian, who ascended the great river from its mouth, and established another post above Lake Pepin. Capt. John Carver, the explorer of the country of the upper Mississippi, visited the falls of St. Anthony in 1776, being the first British traveler who reached the spot. On March 20, 1804, Upper Louisiana was organized, consisting of Arkansas, Missouri, Iowa, and a large portion of Minnesota. From this time onward the progress of exploration was rapid, and settlement followed in its train. The first really extensive exploration of any large part of what

is now Minnesota was made between 1817 and 1823 by Maj. S. H. Long, of the United States engineer corps, in command of a government expedition. About the same time the Red River received its first visitant. Thomas Douglas, earl of Selkirk, an Englishman of eccentric character, went, in 1817, to what is now Winnipeg, by way of York river. Having been struck with the agricultural possibilities of the region about the Red River of the North, he induced a colony of Swiss farmers to settle there. These were disappointed in the country, and unused to the severity of the climate, so that they finally removed to the vicinity of St. Paul and contributed to the earliest development of the agricultural industry of the State. In 1821 Colonel Snelling built, at the junction of the Minnesota and Mississippi rivers, a stronghold which he named Fort St. Anthony. The name was changed to Fort Snelling in his honor, in 1824, and the fort is still an important post as a base of supplies for the newer northwest. The first steamboat made its appearance at the head of navigation in 1823. The settlement of St. Paul, one of the oldest towns as well as the capital, is commonly dated from 1846, at which time there were a few shanties on its site. Population now began to arrive in constantly increasing numbers, and on March 3, 1849, a bill passed Congress for organizing the territory. It was proposed at one time to name it Itasca, but the name Minnesota, meaning, "sky-tinted water," and originally applied to the river bearing that title, was finally retained. The western boundary of the territory was fixed at the Missouri river. The population was but 4,057, the largest town had but a few hundred inhabitants, and a large part of the soil of the State still belonged to the Indians. But progress now began in earnest. A constitution was adopted in 1857, and on May 11, 1858, Minnesota was admitted as a State, with a population, according to the last territorial census, of 150,037.

One of the first acts of the new State was the issue of railroad bonds. Soon after came the civil war. Within two months of Lincoln's first call for troops the first Minnesota regiment, over 1,000 strong, was mustered into service. By August of 1862, ten regiments had been called for and furnished. In all the State supplied to the armies of the Union 25,052 men, or about one-seventh of its entire population at the outbreak of the war.

In the meantime there occurred in 1862, the horrible outbreak known as the Sioux massacre. Settlements were cut off, isolated settlers murdered, and even a strong post like Fort Ridgely was attacked. The outbreak spread over a large portion of the State; several severe engagements were fought; and it was not until the State had a thoroughly equipped military force ready for the campaign that the Indians began to flee or to give themselves up. By this time over 700 persons had been murdered, 200, chiefly women, taken captive; eighteen counties were ravaged, and 30,000 people were homeless. The property loss was not less than \$3,000,000.

MINNOW (*Leuciscus phoxinus* or *Phoxinus phoxinus*) is the smallest British Cyprinoid, readily distinguished by its very small scales. It is abundant in rivers, brooks, and lakes, always swimming in schools, and shifting its ground in search of food, which consists of every kind of vegetable and animal substance. It ranges from southern Europe to Scandinavia, and from Ireland into northeastern Asia; in the Alps it attains to a higher altitude than any other Cyprinoid, viz., to nearly 8,000 feet. Its usual size varies between two and three inches; but in suitable localities, especially in Germany, it is known to reach a length of from four to five inches.

MINO DI GIOVANNI, called DA FIESOLE, was

born at Poppi in the Casentino in 1431. He had property at Fiesole, whence his usual name. Mino was a friend and fellow-worker both with D. da Settignano and Matteo Civitate, all three being about the same age. There is considerable similarity in their works, showing mutual influence. Mino's sculpture is remarkable for its gem-like finish and extreme delicacy of detail, as well as for its spirituality and strong devotional feeling. Some of Mino's portrait busts and delicate profile bas-reliefs are preserved in the Bargello at Florence; they are full of life and expression, though without the extreme realism of Verrocchio and other sculptors of his time. He died in 1486.

MINOR. See INFANT.

MINORCA. See BALEARIC ISLANDS.

MINORITES. See FRANCISCANS.

MINOS, a legendary king of Crete, in whom both historical and religious elements are united. The historical element lies in the fact that an early civilization and maritime power had its seat in Crete. The Phœnician intercourse played a great part in developing this island state, and Minos is sometimes called a Phœnician. It is highly probable that the name Minos is the Greek form of the original *Manva*, i.e., "endowed with thinking," which is seen in the Hindu *Manu* and the Germanic *Mann*. As in all other heroized forms of the god of the dead, there is both a terrible and a wise and beneficent side in the character of Minos. Cretan legends described him as the wild huntsman of the forests and mountains, the lover of the nymphs, though his love means death to them. His death is localized in the far west, in the land of sunset; his grave was shown at Camicus near Agrigentum, attached to a temple of Aphrodite. The Minotaur is one of those monstrous forms which were suggested to the Greek fancy by the quaint animals common in Oriental art. It was shut up in the LABYRINTH (*q.v.*), which was constructed by the skilled artist Dædalus. Now a son of Minos named Androgeus had been killed by the Athenians, and Minos as a punishment required that seven Athenian youths and seven maidens should be sent every ninth year and given up to the Minotaur to be devoured. When this sacrifice took place for the third time Theseus came as one of the hostages, and slew the Minotaur with the help of Ariadne.

MINOTAUR. See MINOS, *ante*.

MINSK, a western government of Russia, is bounded by Vilna, Vitebsk, and Moghileff on the north and east, and by Tchernigoff, Kieff, Volhynia, and Grodno on the south and west, and has an area of 35,175 square miles. The surface is undulating and hilly in the northwest, where a narrow plateau and a range of hills of the Tertiary formation runs to the northeast, separating the basin of the Niemen, which flows into the Baltic, from that of the Dnieper, which sends its waters into the Black Sea. The population of the province may be estimated at about 1,350,000, mostly White Russians (67 per cent.); there are also Poles (about 11 per cent.), especially in the western districts, Jews (more than 10 per cent.), Little Russians (5 per cent.), and Russians (2 per cent.). About 70,000 are considered Lithuanians; there are also 4,000 Tartars, whose presence can be traced to the raids of their ancestors on Lithuania in the thirteenth century, and about 2,000 German agriculturists who settled in the last century.

MINSK, the capital of the above province, is situated on the Svisloch, a tributary of the Berezina, 465 miles by rail west from Moscow. It has 43,500 inhabitants, of whom one-third are Jews of the poorest class; the others are White Russians, Poles, and Tartars (about 700). The manufactures are few and insignificant.

MINSTREL. The "minstrels," according to Bishop

Percy, "were an order of men in the Middle Ages who united the arts of poetry and music, and sang to the harp verses of their own composing, who appear to have accompanied their songs with mimicry and action, and to have practiced such various means of diverting as were much admired in those rude times, and supplied the want of more refined entertainments." This conception of the "minstrel" has been generally accepted in England ever since Percy published his *Reliques of Ancient Poetry*, which he gave to the world as the products of the genius of these anonymous popular poets and harpers. The name has been fixed in the language by the usage of romantic poets and novelists; Scott's "last minstrel" and Moore's "minstrel boy" were minstrels in Percy's sense of the word. All the allusions to minstrels in literature from Langland's time to Spenser's point to them as strolling musicians. Some of them may have sung to the harp verses of their own composing, and some of them may have composed some of the ballads that now charm us with their fresh and simple art; but the profession of the "minstrel," properly so-called, was much less romantic than Bishop Percy painted it.

MINT. The mint is the place where the coinage of a country is manufactured, and whence it is issued by sovereign authority, under special conditions and regulations. The privilege of coining has in all ages and countries belonged to the sovereign. At a very early stage of civilization it was found necessary to have some definite medium of exchange, in order to avoid the great inconvenience arising from the system of payment in kind, which was the primitive and natural method. It was not long before metal came to be used as such a medium, probably from its durability and portability, and in the case of gold and silver on account of their intrinsic value. The less liable the value of a metal is to change the better is it suited for a standard of value.

The metals chiefly used were silver and brass, which were at first simply exchanged by weight for commodities of all kinds. As commercial transactions became more numerous and more complicated, this system of payment grew troublesome, and it was found convenient to divide the mass of metal into small parts, which soon took the form of rough coins. But the principle of payment by weight was retained through many centuries, and is perpetuated, though in name only, in the word "pound."

The actual operations of coining in early times were few in number and simple in character. The metals forming the alloy were melted together in the proportion necessary to bring them to the required standard, and the alloy thus obtained was cast into bars, which were reduced by hammering to the requisite thickness. They were then cut with shears into pieces more or less regular in size and form, roughly annealed, and finally impressed with the prescribed device by a blow with a hammer.

The last-named appears to have been the only part of the process which was performed with any great amount of care. It was long before the system of coining by hand was superseded by the coining press, or mill, which, even after its first introduction, was only very slowly adopted. Several attempts were made to introduce machinery for coining before it was brought into active use, the objection to it being its great expense. The mill and screw were finally introduced into the mint under Charles II., when many improvements were also made in the preliminary operations. Steam-power was first applied in 1810, when the vacuum screw-press was introduced. In 1839 Uhlhorn invented the lever-press, which still remains in use.

The subject of the design on coins, besides being interesting from both an artistic and an historical point of view, becomes very important when it is remembered that it is the impression of the coin with the authorized device which makes it legally current. The artistic merits of the design of the early Greek coins are well known, and prove that the dies from which the coins were struck must have been engraved with much skill and care. It has been ascertained that the impressions on the reverse of very early Greek coins were produced by the rough surface of the anvil or the nail head on which they were placed, while the obverse was struck with the die. A little later the device on the reverse of the coins was obtained by placing the blank piece on small points of metal arranged in geometrical form which caused corresponding indentations on the coins when struck with the hammer. The beauty and accuracy of design on coins gradually increased as art and manual skill developed, and probably culminated at the period of the Renaissance.

Although it has been the custom since the time of the Saxons to stamp coins with the head of the reigning monarch, it does not appear that any attempt at actual portraiture was made in England until the reign of Henry VII. Since then much care seems to have been taken to stamp the coins with a true likeness of the monarch.

In the United States there are five mints—at Philadelphia (since 1793), New Orleans (1835), San Francisco (1854), Carson City and Denver—all under the charge of the Bureau of the Mint of the U. S. Treasury Department, and presided over by the Director of the Mint. Only the first three are in active operation, the other two are really assay offices; and at Philadelphia alone all the authorized coins are struck. The United States coins and their weights are as follows, those marked with an asterisk having been discontinued:

Denomination.	Weight in Grains.	Denomination.	Weight in Grains.
GOLD.		20 cent	77.16
Double eagle.....	516	Dime	38.58
Eagle.....	258	Half-dime	19.2
Half-eagle.....	129	3 cent.....	11.52
Quarter-eagle.....	64.5	MINOR COINS.	
3 dollar piece.....	77.4	5 cent (nickel).....	77.16
Dollar.....	25.8	3 cent (nickel).....	30
SILVER.		2 cent (bronze).....	96
Dollar.....	412.5	Cent (copper).....	168
Trade-dollar.....	420*	Cent (nickel).....	72
Half-dollar.....	192.9	Cent (bronze).....	48
Quarter-dollar.....	96.45	Half-cent (copper) 84	

The total amount of gold coinage minted from 1793 to the end of 1885 was \$1,389,981,508.50; silver, \$434,224,610.00; minor coin, \$17,463,608.44.

MINT, botanically *Mentha*, a genus of labiate plants, comprising about twenty species of perennial herbs, widely distributed throughout the temperate and subtropical portions of the globe. All the species are furnished with square stems, opposite, aromatic leaves, and creeping roots. The flowers are arranged in axillary cymes, which either form separate whorls or are crowded together into a terminal spike. The corolla is usually small, and of a pale purple or pinkish color; it has four nearly equal lobes, and incloses two long and two short stamens. Great difficulty is experienced by botanists in discriminating the species of this genus by reason of the occurrence of a large number of intermediate forms, nearly three hundred of which have been named and described. Many of these varieties are permanent in consequence of being propagated by stolons.

All the plants of the genus *Mentha* abound in a volatile oil, which is contained in small receptacles

having the appearance of resinous dots in the leaves and stems. The odor of the oil is similar in several species, but is not distinctive, the same odor occurring in varieties of distinct species, while plants which cannot be distinguished by any botanical character possess the same odor.

MINTO, SIR GILBERT ELLIOT, FIRST EARL OF, was born at Edinburgh, April 23, 1751. After spending the winters of 1766 and 1767 at Edinburgh University, Elliot entered Oxford. On quitting the university he became a member of Lincoln's Inn, and was in 1774 called to the bar. He entered parliament in 1776, the year of his father's death. Although he gave a general support to Lord North's administration, he from the beginning occupied an independent position, and in 1782 supported the address of the Commons against an offensive war with America. From this time he became a declared follower of Fox and Burke, with the latter of whom he gradually came to be on terms of great intimacy. He was created Baron Minto in 1797, and after filling several diplomatic posts with great success became in 1807 governor-general of India. He was created Earl of Minto and Viscount Melgund in 1813. He returned to England in 1814, and died on June 21st of that year.

MINUCIUS FELIX, MARCUS, one of the earliest, if not the earliest, of the Latin apologists for Christianity. Of his personal history nothing is known, and even the date at which he wrote can be only approximately ascertained.

MINUET (Fr. *Menuet*, from [*pas*] *menus*), a very graceful kind of dance, consisting of a coupee, a high step, and a balance. Its invention is universally ascribed to the inhabitants of Poitou. The melody begins with the down beat, and contains three crotchets in a bar. The music is made up of two strains, which, from being repeated, are called *reprises*, each consisting of eight or more bars, but very rarely of an odd number. The finest minuets we possess are those in Handel's *Samson* and Mozart's *Don Giovanni*.

MIRABEAU, HONORÉ GABRIEL RIQUETI, COMTE DE, one of the greatest statesmen and orators France has ever produced, was born at Bignon, near Nemours, on March 9, 1749. When but three years old he had a virulent attack of confluent smallpox which left his face forever disfigured, and contributed not a little to nourish his father's dislike to him. His early education was conducted by Lachabeaussière, and he was entered at a pension militaire at Paris, kept by an Abbé Choquart. On leaving this school in 1767 he received a commission in the cavalry regiment of the Marquis de Lambert, which his grandfather had commanded years before. He at once began love making, and in spite of his ugliness succeeded in winning the heart of the lady to whom his colonel was attached, which led to such scandal that his father obtained a *lettre de cachet*, and the young scapegrace was imprisoned in the isle of Rhé. The love affairs of Mirabeau form quite a history by themselves, and a well-known history, owing to the celebrity of the letters to Sophie; and the behavior of the marquis in perpetually imprisoning his son is equally well known, and as widely blamed. Mirabeau was not a statesman of the Alcibiades type, and he did not develop his great qualities of mind and character until his youthful excesses were over.

On being released from his first imprisonment, the young count, who had always intended to continue his military career, obtained leave to accompany as a volunteer the French expedition which was to effect the reduction of Corsica. The conquest was one of sheer numerical strength, for the whole population was on the side of Paoli, and Mirabeau, perceiving the value of

public opinion, is said to have written a treatise on the oppression the Genoese had formerly exercised over the island, which the government was ready to publish had not the Marquis de Mirabeau thought fit to destroy it because of its divergence from his own philosophical and economical views. For his services in Corsica Mirabeau was made a captain of dragoons, though not in any particular regiment, and on his return his father endeavored to make use of the literary ability he had shown for the advancement of his own economical theories. He tried to keep on good terms with his father, though he could not advocate all his ideas, and even went so far in 1772 as to marry a rich heiress; a daughter of the Marquis de Marignane, whose alliance his father had procured for him. He did not live happily with her, and in 1774 was ordered into semi-exile in the country, at his father's request, where he wrote his earliest extant work, the *Essai sur le Despotisme*. His violent disposition now led him to quarrel with a country gentleman who had insulted his sister, and his semi-exile was changed by *lettre de cachet* into imprisonment in the Chateau d'If. In 1775 he was removed to the castle of Joux, to which, however, he was not very closely confined, having full leave to visit in the town of Pontarlier. Here he met Marie Therèse de Monnier, his Sophie as he called her, a married woman, for whom he conceived a violent passion. The affair ended by his escaping to Switzerland, where Sophie joined him; they then went to Holland, where he lived by hack-work for the booksellers; meanwhile Mirabeau had been condemned to death at Pontarlier for *rapt et vol*, of which he was certainly not guilty, as Sophie had followed him of her own accord, and in May, 1777, he was seized by the French police, and imprisoned by a *lettre de cachet* in the castle of Vincennes. There he remained three years and a half, and with his release ends the first and most disgraceful period of his life. During his imprisonment he seems to have learned to control his passions from their very exhaustion, for the early part of his confinement is marked by the indecent letters to Sophie (first published in 1793), and the obscene *Erotica Biblion* and *Ma Conversion*, while to the later months belongs his first political work of any value, the *Lettres de Cachet*. The *Essai sur le Despotisme* was an ordinary but at times eloquent declamation, showing in its illustrations a wide miscellaneous knowledge of history, but the *Lettres de Cachet* exhibits a more accurate knowledge of French constitutional history skillfully applied to an attempt to show that an existing actual grievance was not only philosophically unjust, but constitutionally illegal.

With his release from Vincennes begins the second period of Mirabeau's life. He found that his Sophie was an idealized version of a rather common and ill-educated woman, and she speedily consoled herself with the affection of a young officer, after whose death she committed suicide. Mirabeau first set to work to get the sentence of death still hanging over him reversed, and by his eloquence not only succeeded but got M. de Monnier condemned in the costs of the whole law proceedings. From Pontarlier he went to Aix, where he claimed the court's order that his wife should return to him. About this time began his connection with Madame de Nehra, which sweetened the ensuing years of toil and brought out the better points of his character. She was the daughter of Zwier van Haren, a Dutch statesman and political writer, and was a woman of a far higher type than Sophie, more educated, more refined, and more capable of appreciating Mirabeau's good points and helping him to control his passions. After a period of work in Holland he betook himself to England, where his treatise on *Lettres de Cachet* had

been much admired. Romilly was introduced to Mirabeau by D'Ivernois, and readily undertook to translate the *Considerations on the Order of Cincinnatus*.

He had read a pamphlet published in America attacking the proposed order, which was to form a bond of association between the officers who had fought in the American War of Independence against England; the arguments struck him as true and valuable, so he rearranged them in his own fashion, and rewrote them in his own oratorical style. On his return to Paris he had become acquainted with Clavières, a Genevese exile, who was minister of finance during the Revolution, and who now introduced him to a banker named Panchaud. Mirabeau, though ever ready to take money for what he wrote, never sold his opinions, or wrote what he did not really believe. The very eloquence of his style rests upon the enthusiastic conviction that he himself was right, and those who differed from him were stupidly and wilfully wrong. A pamphlet brought him into a controversy with Beaumarchais, who certainly did not get the best of it, but it lost him any chance of literary employment from Government. However, his ability was too great to be neglected, and after a preliminary tour in the early spring of 1786 he was dispatched in June, 1786, on a secret mission to the court of Prussia, from which he returned in January, 1787, and of which he gave a full account in his *Histoire Secrète de la Cour de Berlin*. The months he spent at Berlin were important ones in the history of Prussia, for in them Frederick the Great died. He failed to conciliate the new king Frederick William; and thus ended Mirabeau's one attempt at diplomacy. He had offered himself as a candidate for the office of secretary to the Assembly of Notables which the king had just convened, and to bring his name before the public published another financial work, the *Denonciation de l'Agiotage*, dedicated to the king and notables, which abounded in such violent diatribes that he not only lost his election, but was obliged to retire to Tongres; and he further injured his prospects by publishing the reports he had sent in during his secret mission at Berlin. But 1789 was at hand; the states-general was summoned; Mirabeau's period of probation was over, and he was at last to have that opportunity of showing his great qualities both as statesman and as orator on a worthy arena.

On hearing of the king's determination to summon the states-general, Mirabeau started for Provence, and offered to assist at the preliminary conference of the noblesse of his district. They rejected him; he appealed to the *tiers état*, and was returned both for Aix and for Marseilles. He elected to sit for the former city, and was present at the opening of the states-general on May 4, 1789. From this time the record of Mirabeau's life forms the best history of the first two years of the Constituent Assembly, for at every important crisis his voice is to be heard, though his advice was not always followed. It is impossible here to detail minutely the history of these two eventful years; it will be rather advisable to try and analyze the manner in which Mirabeau regarded passing events, and then show how his policy justifies our analysis.

Mirabeau possessed at the same time great logical acuteness and most passionate enthusiasm; he was, therefore, both a statesman and an orator, and the interest of the last two years of his life lies mainly in the gradual but decided victory of the statesmanlike and practical over the impulsive and oratorical qualities.

In the first stage of the history of the states-general Mirabeau's part was very great. He was soon recognized as a leader, because he always knew his own mind, and was prompt at emergencies. To him is to be attributed the successful consolidation of the National Assembly,

and the address to the king for the withdrawal of the troops assembled by De Broglie. When the taking of the Bastille had assured the success of the Revolution, he was the one man who warned the Assembly of the futility of passing fine-sounding decrees and the necessity for acting. He declared that the famous night of August 4th was but an orgy, giving the people an immense theoretical liberty while not assisting them to practical freedom, and overthrowing the old régime before a new one could be constituted. Still more did he show his foresight when he attacked the dilatory behavior of the Assembly, which led to the catastrophes of October 5th and 6th. He implored the Assembly to strike while the iron was hot, and at once solve in a practical manner the difficult problems presented by the abolition of feudalism. But the Assembly consisted of men inexperienced in practical politics, who dreamed of drawing up an ideal constitution preluded by a declaration of rights in imitation of the Americans; and for two months the Assembly discussed in what words the declaration should be expressed, while the country was in a state of anarchy, declaring old laws and customs abolished and having no new ones to obey or follow, disowning the old administrative system and having no new one yet instituted, while Paris was starving and turbulent, and the queen and her friends planning a counter-revolution. The result of these two months' theorizing was the march of the women to Versailles, and the transfer of the king to Paris. Mirabeau now saw clearly that his eloquence would not enable him to guide the Assembly by himself, and that he must therefore try to get some support. He wished to establish a strong ministry, which should be responsible like an English ministry, but to an assembly chosen to represent the people of France better than the English House of Commons then represented England. He attempted to form an alliance with Lafayette, but the general was as obstinate as Mirabeau himself, and had his own theories about a new French constitution. Mirabeau tried for a time, too, to act with Necker, and obtained the sanction of the Assembly to Necker's financial scheme, not because it was good, but because, as he said, "no other plan was before them, and something must be done."

Hitherto weight has been laid on the practical side of Mirabeau's political genius; his ideas with regard to the Revolution after October 5th and 6th must now be examined, and this can be done at length, thanks to the publication of Mirabeau's correspondence with La Marck, a study of which is indispensable for any correct knowledge of the history of the Revolution between 1789 and 1791. Mirabeau followed up his *Mémoire* by a scheme of a great ministry to contain all men of mark—Necker as prime minister, "to render him as powerless as he is incapable, and yet preserve his popularity for the king," the archbishop of Bordeaux, the Duc de Liancourt, the Duc de la Rochefoucauld, La Marck, Talleyrand bishop of Autun at the finances, Mirabeau without portfolio, Target mayor of Paris, Lafayette generalissimo to reform the army, Ségur (foreign affairs), Mounier, and Chapelier. This scheme got noised abroad, and was ruined by a decree of the Assembly of November 7, 1789, that no member of the Assembly could become a minister; this decree destroyed any chance of that necessary harmony between the ministry and the majority of the representatives of the nation existing in England, and so at once overthrew Mirabeau's present hopes and any chance of the permanence of the constitution then being devised. The queen utterly refused to take Mirabeau's counsel, and La Marck left Paris. However, in April, 1790, he was suddenly recalled by the Comte de Mercy-Argenteau, the Austrian ambassador at Paris,

and the queen's most trusted political adviser, and from this time to Mirabeau's death he became the medium of almost daily communications between the latter and the queen. From the month of May, 1790, to his death in April, 1791, Mirabeau remained in close and suspected, but not actually proved connection with the court, and drew up many admirable state-papers for it. In return the court paid his debts; but it ought never to be said that he was bribed, for the gold of the court never made him swerve from his political principles—never, for instance, made him a royalist.

On the great subject of peace and war he supported the king's authority, and with some success. Mirabeau almost alone of the Assembly understood the position of the army under a limited monarchy. Contrary to the theorists, he held that the soldier ceased to be a citizen when he became a soldier; he must submit to be deprived of his liberty to think and act, and must recognize that a soldier's first duty is obedience.

Mirabeau held it to be just that the French people should conduct their Revolution as they would, and that no foreign nation had any right to interfere with them, so long as they kept themselves strictly to their own affairs. But he knew also that neighboring nations looked with unquiet eyes on the progress of affairs in France, that they feared the influence of the Revolution on their own peoples, and that foreign monarchs were being prayed by the French emigrés to interfere on behalf of the French monarchy. To prevent this interference, or rather to give no pretext for it, was his guiding thought as to foreign policy. He had been elected a member of the comité diplomatique of the Assembly in July, 1790, and became its reporter at once; and in this capacity he was able to prevent the Assembly from doing much harm in regard to foreign affairs.

In the beginning of 1791 his death was very near; and he knew it to be so. The wild excesses of his youth and their terrible punishment had weakened his strong constitution, and his parliamentary labors completed the work. In March his illness was evidently gaining on him, to his great grief, because he knew how much depended on his life, and felt that he alone could yet save France from the distrust of her monarch and the present reforms and from the foreign interference, which would assuredly bring about catastrophes unparalleled in the history of the world. His vanity appears in its most gigantic proportions in his last utterances during his illness; but many of them have something grand in their sound, as his last reported expression when he looked upon the sun—"If he is not God, he is at least His cousin-german." When he could speak no more he wrote with a feeble hand the one word "dormir," and on April 2, 1791, he died.

MIRABEAU, VICTOR RIQUETI, MARQUIS DE, himself a distinguished author and political economist, but more famous as the father of the great Mirabeau, was born at Pertuis near the old Chateau de Mirabeau on October 4, 1715. He was brought up very sternly by his father, and in 1729 joined the army. In 1737 he came into the family property on his father's death. In 1756 Mirabeau made his first appearance as a political economist by the publication of his *Ami des Hommes ou traite de la population*. In 1760 he published his *Theorie de l'Impot*, in which he attacked with all the vehemence of his son the farmers-general of the taxes, who got him imprisoned for eight days at Vincennes, and then exiled to his country estate at Bignon. He was recognized as a leader of political thinkers by Prince Leopold of Tuscany, afterward emperor, and by Gustavus III. of Sweden, who in 1772 sent him the grand cross of the order of Vasa. His marriage had not been happy; he had separated from his wife by

mutual consent in 1762, and had, he believed, secured her safely in the provinces by a lettre de cachet, when in 1772 she suddenly appeared in Paris, and soon after commenced proceedings for a separation. His wife would not let him rest; her plea was rejected in 1777, but she renewed her suit, and, though the great Mirabeau had pleaded his father's ease, was successful in 1781, when a decree of separation was pronounced. This trial had quite broken the health of the marquis, as well as his fortune; he sold his estate at Bignon, and hired a house at Argenteuil, where he lived quietly till his death on July 11, 1789.

MIRAGE. The density of the air generally diminishes with the height; rays of light proceeding obliquely upwards from an object then become more and more nearly horizontal, but generally pass away into space. Assume the density to diminish with the height with unusual rapidity, as when the air is cooler the nearer it is to the earth; the obliquely ascending rays may become quite horizontal and then bend down towards the earth, reaching it at a distant point. The observer at that point sees distant objects at an unusual elevation, or sees above the true horizon erect images of objects which may or may not be beyond the horizon. This is what the sailors generally call looming, and it causes us sometimes to see distant coasts with unusual distinctness, or to see from a mountain top a double horizon, such as is regularly seen in the autumn mornings from the Colorado foot-hills across the prairies. If the layer of air near the earth, say 50 or 100 feet thick, be uniformly dense, as in the cold air over a frozen sea, and a warmer stratum lie above it in which the density rapidly diminishes, so that the rays are brought back to the earth as above, we find, on tracing the path of the rays reaching the observer from the top and the bottom of the distant object respectively, that these rays have crossed one another in the hot stratum; the observer, therefore, seems to see the object suspended in the air magnified and upside down; and this may happen while the observer sees the object itself by direct vision through the lower air. An intermediate stratum between a cold ground-stratum and a warm upper stratum gives rise to more than one image, inverted or erect, or both, according to positions. In the mirage of the Sahara and other arid deserts the conditions are reversed; the air is hottest nearest the hot sand; skylight rays descending, become bent upwards; the eye receives an impression resembling that produced by the reflection of skylight from water; the illusion is rendered more perfect by the flickering due to convection currents, which causes an appearance like a breeze playing over the illusory water.

MIRAMON, MIGUEL, a Mexican soldier of French extraction, was born in the city of Mexico, September 29, 1832, and shot along with the emperor Maximilian at Queretaro, June 19, 1867. While still a student he helped to defend the military academy at Chapultepec against the forces of the United States; and, entering the army in 1852, he rapidly came to the front during the civil wars that disturbed the country. It was largely due to Miramon's support of the ecclesiastical party against Alvarez and Comonfort that Zuloaga was raised to the presidency; and in 1859 he was called to succeed him in that office. Decisively beaten, however, by the liberals, he fled the country in 1860, and spent some time in Europe, earnestly advocating foreign intervention in Mexican affairs; and when he returned it was as a partisan of Maximilian. His ability as a soldier was best shown by his double defense of Puebla in 1856.

MIRANDA, FRANCESCO, was born at Santa Fé in New Granada in 1754. He entered the army, and served against the English in the American War of In-

dependence. The success of that war inspired him with a hope of being the Washington of his own country, and a belief that the independence of Spanish America would increase its material prosperity. With these views he began to scheme a revolution, but his schemes were discovered and he had only just time to escape to the United States. Thence he went to England, where he was introduced to Pitt, but chiefly lived with the leading members of the opposition—Fox, Sheridan, and Romilly.

In April, 1792, he went to Paris, with introductions to Pétion and the leading Girondists, hoping that men who were working so hard for their own freedom might help his countrymen in South America. France had too much to do in fighting for its own freedom to help others; but Miranda's friends sent him to the front with the rank of general of brigade. He distinguished himself under Dumouriez, was intrusted in February, 1793, with the conduct of the siege of Maestricht, and commanded the left wing of the French army at the disastrous battle of Neerwinden. Although he had given notice of Dumouriez's projected treachery, he was put on his trial for treason on May 12. He was unanimously acquitted, but was soon again thrown into prison, and not released till after the 9th Thermidor. He again mingled in politics, and was sentenced to be deported after the struggle of Vendémiaire. Yet he escaped and continued in Paris till the *coup d'état* of Fructidor caused him finally to take refuge in England. Aided by two American citizens, Colonel Smith and Mr. Ogden, he equipped a small ship, the *Leander*, in 1806, and with the help of the English admiral Sir A. Cochrane made a landing near Carácas, and proclaimed the Colombian republic. He had some success, and would have had more had not a false report of peace between France and England caused the English admiral to withdraw his support. At last in 1810 came his opportunity; the events in Spain which brought about the Peninsular War had divided the authorities in Spanish America, some of whom declared for Joseph Bonaparte, others for Ferdinand VII., while others again held to Charles IV. At this moment Miranda again landed, and had no difficulty in getting a large party together who declared a republic both in Venezuela and New Granada or Columbia. But Miranda's desire that all the South American colonies should rise, and a federal republic be formed, awoke the selfishness and pride of individual provincial administrations, and thus weakened the cause, which further was believed to be hateful to heaven owing to a great earthquake on March 26, 1812. The count of Monte Verde, the Bourbon governor, had little difficulty in defeating the dispirited forces of Miranda, and on July 26th the general capitulated on condition that he should be deported to the United States. The condition was not observed; Miranda was moved from dungeon to dungeon, and died in 1816 at Cadiz.

MIRANDOLA. See PICO.

MIRKHOND. Mohammed bin Kháwandsháh bin Mahmúd, commonly called Mírkhwánd or Mírkháwand, more familiar to Europeans under the name of Mirkhond, was born in 1433. The discovery of older works on Asiatic history has diminished to some extent the value of Mirkhond's *Rauzat*, but it still maintains its high position as one of the most marvelous achievements in literature from the pen of one man. Mirkhond died in 1498.

MIROPOLIE, a town of Russia, situated in the government of Kursk, district of Suja, eighty-three miles southwest of Kursk and twenty-five miles from the Sumy railway station. Population, 12,000.

MIRROR. It is only since the early part of the sixteenth century that mirrors have become articles of

household furniture and decoration. Previous to that time—from the twelfth to the end of the fifteenth century—pocket mirrors or small hand mirrors carried at the girdle were indispensable adjuncts to ladies' toilets. The pocket mirrors consisted of small circular plaques of polished metal fixed in a shallow circular box, covered with a lid. Mirror cases were chiefly made of ivory, carved with relief representations of love or domestic scenes, hunting, and games, and sometimes illustrations of popular poetry or romance. Gold and silver, enamels, ebony, and other costly materials were likewise used for mirror cases, on which were lavished the highest decorative efforts of art workmanship and costly jewelry. The mirrors worn at the girdle had no cover, but were furnished with a short handle. In 625 Pope Boniface IV. sent Queen Ethelberga of Northumbria a present of a silver mirror; and there is ample evidence that in early Anglo-Saxon times mirrors were well known in England. It is a remarkable fact that on many of the sculptured stones of Scotland, belonging probably to the seventh, eighth, or ninth century, representations of mirrors, mirror cases, and combs occur. The method of backing glass with thin sheets of metal for mirrors was well known in the Middle Ages at a time when steel and silver mirrors were almost exclusively employed. It is known that small convex mirrors were commonly made in southern Germany before the beginning of the sixteenth century, and these continued to be in demand under the name of bull's-eyes till comparatively modern times. It was, however, in Venice that the making of glass mirrors on a commercial scale was first developed; and that enterprising republic enjoyed a rich and much-prized monopoly of the manufacture for about a century and a half.

The manufacture of glass mirrors, with the aid of Italian workmen, was practiced in England by Sir Robert Mansel early in the seventeenth century, and about 1670 the duke of Buckingham was concerned in a glass-work at Lambeth, where flint glass was made for looking-glasses. These old English mirrors, with beveled edges in the Venetian fashion, are still well known.

The Venetians guarded with the utmost jealousy the secrets of their varied manufactures, and gave most exceptional privileges to those engaged in such industries.

The term "silvering," as applied to the formation of a metallic coating on glass for giving it the properties of a mirror, was till quite recently a misnomer, seeing that till about 1840 no silver was used in the process. Now, however, a large proportion of mirrors are made by depositing on the glass a coating of pure silver, and the old amalgamation process is comparatively little used.

The process of amalgamation consists in applying a thin amalgam of tin and mercury to the surface of glass, which is done on a perfectly flat and horizontal slab of stone bedded in a heavy, iron-bound wooden frame, with a gutter running round the outer edge. On the surface of this table, which must be perfectly smooth and level, is spread a sheet of tin-foil, somewhat larger than the glass to be operated on, and after all folds and creases have been completely removed, by means of stroking and beating with a covered wooden rubber, the process of "quickenning" the foil is commenced. A small quantity of mercury is rubbed lightly and quickly over the whole surface, and the scum of dust, impure tin, and mercury is taken off. Mercury is then poured upon the quickened foil, until there is a body of it sufficient to float the glass to be silvered (about one-quarter of an inch deep), and, the edge at one of the sides having been cleared of the scum peculiar to mercury, the glass (scrupulously cleaned simultaneously with the above operations) is slid from that side over the surface

of the mercury. Weights are placed over the surface until the greater part of the amalgamated mercury is pressed out, the table is then tilted diagonally, by means of dumb-screws, and all superfluous mercury finds its way to the gutter. The glass is left twenty-four hours under weights; it is then turned over, silvered side up, and removed to a drainer with inclining shelves, where by slow degrees, as it dries and hardens, it is brought to a vertical position, which in the case of large sheets may not be arrived at in less than a month. This process yields excellent results, producing a brilliant silver-white metallic luster which is only subject to alteration by exposure to high temperature, or by contact with damp surfaces; but the mercurial vapors to which the workmen are exposed give rise to the most distressing and fatal affections.

MÍRZÁPUR, a district in the Northwestern Provinces of India, has an area of 5,217 square miles. It is crossed from east to west by the Vindhya and Káimur ranges. A central jungly plateau connects these, and separates the valley of the Ganges from that of the Son. The population in 1872, was 1,015,203 (males, 520,496; females, 494,707), of whom 949,644 were Hindus, 64,809 Mohammedans, and 750 Christians.

MÍRZÁPUR, chief town and administrative headquarters of the above district, is situated on the south bank of the Ganges, fifty-six miles below Allahábád. The population is 67,274, of whom 55,917 are Hindus and 11,053 Mohammedans.

MISDEMEANOR. The word misdemeanor is applied to all those crimes and offenses for which the law has not provided a particular name. Stephen, in his *Digest of the Criminal Law*, adopts the following mode of distinguishing between misdemeanor and other crimes. "Every crime is either treason, felony, or misdemeanor. Every crime which amounts to treason or felony is so denominated in the definitions of crimes hereinafter contained. All crimes not so denominated are misdemeanors." It is customary to speak of misdemeanor as implying a less degree of crime than felony (see FELONY). "Misdemeanors," observes Russell, "have been sometimes termed *misprisions*; indeed the word misprision, in its larger sense, is used to signify every considerable misdemeanor which has not a certain name given to it in the law, and it is said that a misprision is contained in every felony whatsoever, so that the offender may be prosecuted for misprision at the option of the crown." Misprision, in a more restricted sense (or negative misprision), is the concealment of an offense. The rule as to punishment, when no express provision has been made by law, is that "every person convicted of a misdemeanor is liable to fine and imprisonment without hard labor (both or either), and to be put under recognizances to keep the peace and be of good behavior at the discretion of the court."

In New York and some other States of the American Union the legislature has defined felony as any crime which is or may be punishable with death or imprisonment in a State prison, all other crimes being misdemeanors.

MISHNAH. The *Mishnah*, in the most familiar application of the name, is the great collection of legal decisions by the ancient rabbis which forms in each Talmud the text on which the *Gemara* rests, and so is the fundamental document of the oral law of the Jews.

Although the word *Mishnah* is not found in the Bible, it is no doubt a classical Hebrew term, signifying something closely akin to *Mishneh*. The practical significations of *Mishnah* are seven in number: (1) repetition, *i.e.*, tradition; (2) recitation from memory, in contradistinction to reading from a book; (3) study; (4) instruction; (5) system; (6) a paragraph of the

Mishnah: it is invariably employed in this sense in the Babylonian Talmud, and is identical with the word *Halakhah*, used for the same purpose, in the Palestinian Talmud; and (7) the collection of the decisions of the whole "oral law," *i.e.*, the *Mishnah* in the concrete sense.

MISKOLCZ, capital of the Cis-Tisian county of Borsod, Hungary, is situated in a valley watered by the Szinva, ninety miles northeast from Budapest, with which, as also with Debreczen and Kassa (Kaschau), it is directly connected by railway. Population (1890). 25,000.

MISREPRESENTATION. See FRAUD.

MISSAL, the book containing the liturgy, or office of the mass, of the Latin Church. This name began to supersede the older word *Sacramentary* from about the middle of the eighth century.

The first pages of the modern Roman missal are occupied with the *Calendar* and a variety of explanations relating to the year and its parts, and the manner of determining the movable feasts. The general rubrics follow, explaining what are the various kinds of mass which may be celebrated, prescribing the hours of celebration, the kind and color of vestments to be used, and the ritual to be followed, and giving directions as to what is to be done in case of various defects or imperfections which may arise. The *Præparatio ad Missam*, which comes next, is a short manual of devotion containing psalms, hymns, and prayers to be used as opportunity may occur before and after celebration. Next comes the proper of the season, occupying more than half of the entire volume. It contains the proper introit, collect (one or more), epistle, gradual (tract or sequence), gospel, offertory, secreta (one or more), communion, and post-communion for every Sunday of the year, and also for the festivals and ferias connected with the ecclesiastical seasons, as well as the offices peculiar to the ember days, Holy Week, Easter, and Whitsuntide. Between the office for Holy Saturday and that for Easter Sunday the ordinary of the mass, with the solemn and proper prefaces for the year, and the canon of the mass are inserted. The proper of the season is followed by the proper of the saints, containing what is special to each saint's day in the order of the calendar, and by the *Commune Sanctorum*, containing such offices as the common of one martyr and bishop, the common of one martyr not a bishop, the common of many martyrs in paschal time, the common of many martyrs out of paschal time, and the like. A variety of masses to be used at the feast of the dedication of a church, of masses for the dead, and of votive masses (as for the sick, for persons journeying, for bridegroom and bride) follow, and also certain benedictions. Most missals have an appendix also containing certain local masses of saints to be celebrated "*ex indulto apostolico*."

MISSIONS. Christian missions had their origin in the example and the command of our Lord Himself; and the unparalleled boldness on the part of the Founder of Christianity, which dared to anticipate for the Christian faith a succession of efforts which should never cease to cause its propagation to be undertaken as "a distinct and direct work," has been justified by the voice of history. Whereas other religions have spread from country to country as component parts of popular opinion, have traveled with migration or conquest, have passed in the train of things and by the usual channels of communication, the first foundations of the church had hardly been laid before individual missionary activity marked the life of each one of the circle of the apostles.

Of the actual details of their labors we know but little. Three only of the immediate followers of the Savior

have any conspicuous place in the apostolic records and the most illustrious in the whole domain of missionary activity, St. Paul, did not belong to the original twelve. His activity took the form of journeys and voyages, chiefly to large towns, where his message found a point of contact either with the Jewish synagogue or with the aspirations of the Gentile world. The result of his labors and of those of his successors was that toward the middle of the second century the church had gradually extended its conquests through Asia Minor, Greece, Italy, southern Gaul, and northern Africa. Ecclesiastical history can tell but little of the church's earliest teachers, and the infancy of many of the primitive congregations is wrapped in hopeless darkness. Whatever was effected was due to the evangelizing labors of individual bishops and clergy, who occupied themselves "in season and out of season," and toiled zealously and effectively in the spread of the church, though leaving no record of their devotion.

With the fifth century the church found a very different element proposed to her missionary energies and zeal. Her outposts of civilization had scarcely been planted when she was confronted with numberless hordes which had long been gathering afar off in their native wilds, and which were now precipitated over the entire face of Europe. Having for some time ceased to plead for toleration, and learned to be aggressive, she not only stood the shock of change but girded herself for the difficult work of calming the agitated elements of society, of teaching the nations a higher faith than a savage form of nature worship, of purifying and refining their recklessness, independence, and uncontrollable love of liberty, and fitting them to become members of an enlightened Christendom.

The first pioneers who went forth to engage in this difficult enterprise came from the secluded Celtic churches of Ireland and the Scottish Highlands, which, though almost forgotten amid the desolating contest which was breaking up the Roman world, were no sooner founded than they sent forth "armies of Scots" to pour back upon the Continent the gifts of civilization and the gospel. Of many who deserve mention in connection with this period, the most prominent were—Columba, the founder of the famous monastery of Iona, and the evangelizer of the Albanian Scots and northern Picts; Aidan, the apostle of Northumbria; Columbanus, the apostle of the Burgundians of the Vosges; Callich or Gallus, the evangelizer of northeastern Switzerland and Alemannia; Kilian, the apostle of Thuringia; and Trudpert, the martyr of the Black Forest. The energy which warriors were accustomed to put forth in their efforts to conquer was "exhibited in the enterprise of conversion and teaching" by Wilfrid on the coast of Friesland, by Willibrord in the neighborhood of Utrecht, by the martyr-brothers Ewald or Hewald among the "old" or continental Saxons, by Swibert the apostle of the tribes between the Ems and the Yssel, by Adelbert, a prince of the royal house of Northumbria, in the regions north of Holland, by Wursing, a native of Friesland, and one of the disciples of Willibrord, in the same region, and last, not least, by the famous Winfrid or Boniface, the "apostle of Germany," who went forth first to assist Willibrord at Utrecht, then to labor in Thuringia and Upper Hessa, then, with the aid of his kinsmen Wunibald and Willibald, their sister Walpurga, and her thirty companions, to consolidate the work of earlier missionaries, and finally to die a martyr on the shore of the Zuyder Zee.

Devoted, however, as were the labors of Boniface and his disciples, the battle was not yet nearly won. All that he and they and the emperor Charlemagne after them achieved for the fierce untutored world of the

eight century seemed to have been done in vain when, in the ninth, "on the north and northwest the pagan Scandinavians were hanging about every coast and pouring in at every inlet; when on the east the pagan Hungarians were swarming like locusts and devastating Europe from the Baltic to the Alps; when on the south and southeast the Saracens were pressing on and on with their victorious hosts. It seemed then as if every pore of life were choked, and Christendom must be stifled and smothered in the fatal embrace." But it was even now that one of the most intrepid of missionary enterprises was undertaken, and the devoted Anskar went forth and proved himself a true apostle of Denmark and Sweden.

Thus the "gospel of the kingdom" was successively proclaimed to the Roman, the Celtic, the Teutonic, and the Scandinavian world. A contest still more stubborn remained with the Slavonic tribes, with their triple and many-headed divinities, their powers of good and powers of evil, who could be approached only with fear and horror, and propitiated only with human sacrifices. Mission work commenced in Bulgaria during the latter part of the ninth century; thence it extended to Moravia, where two Greek missionaries—Cyril and Methodius—provided for the people a Slavonic Bible and a Slavonic Liturgy; thence to Bohemia, and so onward to the Scythian wilds and level steppes, where arose the Russian kingdom of Ruric the Northman, and where about the close of the tenth century the Eastern Church silently and almost unconsciously bore into the world her mightiest offspring. As late as 1230 human sacrifices were still being offered up in Prussia and Lithuania, and, in spite of all the efforts of the Teutonic Knights to expel by force the last remains of heathenism from the face of Europe, idolatrous practices still lingered among the people, while in the districts inhabited by Lapps, though successful missions had been inaugurated as early as 1335, Christianity cannot be said to have become the dominant religion till at least two centuries later.

The mention of the order of the Teutonic Knights reminds us how the crusading spirit had affected Christendom, and exchanged the patience of a Boniface or an Anskar for the fiery zeal of the warrior of the cross. Out of the crusades arose other efforts to bear the banner of the cross into the lands of the East, and to develop the work which Nestorian missionaries from Baghdad, Edessa, and Nisibis had already inaugurated along the Malabar coast, in the island of Ceylon, and in the neighborhood of the Caspian Sea. In 1245 the Roman pontiff sent two embassies, one to charge the Mongol warriors to desist from their desolating inroads into Europe, the other to attempt to win them over to the Christian faith. Their exertions were seconded in 1253 by the labors of another Franciscan whom Louis IX. of France sent forth from Cyprus, while in 1274 the celebrated traveler Marco Polo, accompanied by two learned Dominicans, visited the court of Kublai Khan, and at the commencement of the fourteenth century two Franciscans penetrated as far as Peking, and kept alive a flickering spark of Christianity in the Tartar kingdom, even translating the New Testament and the Psalter into the Tartar language, and training youths for a native ministry.

These tentative missions in the East were supplemented by others on a larger scale. In 1486 the Cape of Good Hope was rounded by Dias, and in 1508 the foundations of the Portuguese Indian empire were laid by Albuquerque. Columbus in 1492 landed on San Salvador, and the voyages of the Venetian Cabot along the coast of North America opened up a new world to missionary enterprise. These bold discoverers had

secured the countenance of the pope on the condition that wherever they might plant a flag they should be also zealous in promoting the extension of the Christian faith. Thus a grand opportunity was given to the churches of Portugal and Spain.

In the sixteenth century the great organization of the Jesuits came into existence, and one of the first of Loyola's associates, Francis Xavier, was also one of the greatest and most zealous missionaries of his or any other era. Encouraged by the joint coöperation of the pope and of John III. of Portugal, and strongly tinged like Loyola with ideas of chivalry and self-devotion, he disembarked at Goa on May 6, 1542, and before his death on the Isle of St. John (Hiang-Shang) December 2, 1552, he had roused the European Christians of Goa to a new life; labored with singular success among the Paravars, a fisher caste near Cape Comorin, gathered many converts in the kingdom of Travancore, visited the island of Malacca, made his way to and founded a mission in Japan, thence revisited Goa, and impelled by the quenchless desire to unfurl the banner of the cross in China, had set out thither to fall a victim to malignant fever at the early age of forty-six, within sight of that vast empire whose conversion had been the object of his holy ambition.

The immediate successor of Xavier, Antonio Criminalis, was regarded by the Jesuits as the first martyr of their society (1562). Matteo Ricci, an Italian by birth, was also an indefatigable missionary in China for twenty-seven years, while the peculiar methods of unholy compromise with Brahmanism in India followed by Robert de' Nobili drew down the condemnatory briefs of pope after pope, and were fatal to the vitality of his own and other missions. Other representatives of the same order worked with success in evangelizing the Spanish settlement of Paraguay in 1582, while their defeated foes the Huguenots sent forth under a French knight of Malta a body of devoted men to attempt the formation of a Christian colony at Rio Janeiro. By the close of the sixteenth century the unflagging zeal of the Jesuits led to a more complete development and organization of the missionary system of the Roman Church. To give unity and solidity to the work of missions, a committee of cardinals was appointed under the name of the "Congregatio de propaganda fide," and to it was intrusted the entire management of the mission, conducted under the superintendence of the pope. The scheme originated with Gregory XIII., but was not fully organized till forty years afterward, when Gregory XV gave it plenary authority by a bull dated June 2, 1622.

This last period of missionary activity is distinguished in a special degree by the exertions of societies for the development of mission work.

As contrasted with the colossal display of power on the part of the Church of Rome, it must be allowed that the churches which in the sixteenth century broke off from their allegiance to the Latin center at first presented a great lack of anxiety for the extension of the gospel and the salvation of the heathen. During the Protectorate, in 1649, an ordinance was passed for "the promoting and propagating of the gospel of Jesus Christ in New England" by the erection of a corporation, to be called by the name of the President and Society for the Propagation of the Gospel in New England, to receive and dispose of moneys for the purpose, and a general collection was ordered to be made in all the parishes of England and Wales; and Cromwell himself desired a scheme for setting up a council for the Protestant religion, which should rival the Roman Propaganda, and consist of seven councillors and four secretaries for different provinces. On the restora-

tion of the monarchy, through the influence of Richard Baxter with Lord Chancellor Hyde, the charter already granted by Cromwell was renewed, and its powers were enlarged. For now the corporation was styled "The Propagation of the Gospel in New England and the parts adjacent in America," and its object was defined to be "not only to seek the outward welfare and prosperity of those colonies, but more especially to endeavor the good and salvation of their immortal souls, and the publishing the most glorious gospel of Christ among them."

The needs of the colonial church soon excited the attention of others also, and great efforts were made by Bishop Beveridge, Archbishop Wake, Archbishop Sharpe, Bishop Gibson, and afterward by the philosophic Bishop Berkeley, and Bishop Butler, the famous author of the *Analogy*, to develop the colonial church and provide for the wants of the Indian tribes.

With the establishment of the Society for the Propagation of the Gospel in 1701, the era of the activity of societies for carrying out mission work may be said to commence, though the opening of the eighteenth century saw other movements set on foot for the same object. Thus in 1705 Frederick IV. of Denmark founded a mission on the Coromandel coast, and inaugurated the labors of Ziegenbalg, Schultze, and Schwartz, whose devotion and success told with such remarkable reflex influence on the church at home. Again in 1731 the Moravians illustrated in a signal degree the growing consciousness of obligation toward the heathen. Literally with "neither bread nor scrip," they went forth on their pilgrimage, and within ten years they had established missions in the islands of the West Indies, in South America, Surinam, Greenland, among the North American tribes, in Lapland, Tartary, Algiers, Guinea, the Cape of Good Hope, and Ceylon.

Such were the preparations for the more general movements during the last hundred years, and the manifestation of missionary zeal on a scale to which it would be difficult to find a parallel in Western Christianity.

At the close of the last century there were only seven missionary societies in existence, properly so called. Of these three only, the Society for the Propagation of the Gospel in Foreign Parts, the Halle-Danish Society, and the Moravians, had been at work for the greater part of the century, while four, the Church Missionary Society, the Baptist Missionary Society, the London Missionary Society, and the Dutch Society at Rotterdam, began their work only in its tenth decade. To-day these seven have, in Europe and America alone, increased to upward of seventy, and to these must be added, not only several independent societies in the colonies, but numerous missionary associations on a smaller scale, the offspring of English and American societies.

MISSISSIPPI RIVER. The territory drained by the Mississippi river and its tributaries includes the greater part of the United States, lying between the Alleghany Mountains on the east and the Rocky Mountains on the west, and has an area (1,244,000 square miles) considerably larger than all central Europe. The central artery through which the drainage of this region passes is called the Mississippi river for about 1,300 miles above its mouth. The name is then usurped by a tributary, while the main stream becomes known as the Missouri. From its remote sources in the Rocky Mountains to the Gulf of Mexico the total length of the river is about 4,200 miles. The other principal tributaries are the Ohio, the Arkansas, and the Red river, but the Yazoo and the St. Francis often make dangerous contributions in seasons of flood.

Below the influx of the Ohio the Mississippi traverses

alluvial bottom lands liable to overflow in flood seasons. The soil is of inexhaustible fertility, producing large crops of corn in the northern portion, cotton in the middle district, and sugar, rice, and orange groves near the mouth. These bottom lands, averaging about forty miles in width, extend from north to south for a distance of 500 miles, having a general southern slope of eight inches to the mile. The river winds through them in a devious course for 1,100 miles, occasionally on the east side washing bluffs from 100 to 300 feet in height, but usually confined by banks of its own creation, which, as with all sediment-bearing rivers of like character, are highest near the stream itself. The general lateral slope toward the foot hills is about six inches in 5,000 feet, but the normal fall in the first mile is about seven feet. Thus apparently following a low ridge through the bottom lands, the tawny sea sweeps onward with great velocity, eroding its banks in the bends and rebuilding them on the points, now forming islands by its deposits, and now removing them as the direction of the flow is modified by the never-ending changes in progress. Chief among such changes is the formation of cut-offs. Two eroding bends gradually approach each other until the water forces a passage across the narrow neck. As the channel distance between these bends may be many miles, a cascade perhaps five or six feet in height is formed, and the torrent rushes through with a roar audible for miles. The banks dissolve like sugar. In a single day the course of the river is changed, and steamboats pass where a few hours before the plow had been at work. The checking of the current at the upper and lower mouths of the abandoned channel soon obstructs them by a deposit, and forms in a few years one of the characteristic crescent lakes which are so marked a feature on the maps.

The total area of the bottom lands is about 32,000 square miles, of which only a narrow strip along the immediate banks of the main river and of its principal bayous and tributaries has even yet been brought under cultivation. A proper system of protection against overflow would throw open 2,500,000 acres of rich sugar land, 7,000,000 acres of the best cotton land in the world, and 1,000,000 acres of corn land of unsurpassed fertility.

The work of embankment began in 1717, when the engineer De la Tour erected a dyke or levee one mile long to protect the infant city of New Orleans from overflow. Progress at first was slow. In 1770 the settlements extended only thirty miles above and twenty miles below New Orleans; but by 1828 the levees, although quite insufficient in dimensions, had become continuous nearly to the mouth of Red River. In 1850 a great impulse was given to systematic embankment by the United States Government, which gave over to the several States all unsold swamp and overflowed lands within their limits to provide a fund for reclaiming the districts liable to inundation. The action resulting from this caused alarm in Louisiana, for the great bottom lands above were believed to act as reservoirs to receive the highest flood wave; and it was imagined that if they were closed by levees the lower country would be overwhelmed whenever the river in flood rose above its natural banks. The aid of the government was invoked, and Congress immediately ordered the necessary investigations and surveys. This work was placed in charge of Captain (now General) Humphreys, and an elaborate report covering the results of ten years of investigation was published just after the outbreak of the civil war in 1861.

The percentage of sedimentary matter carried in suspension by the water varies greatly at different times, but is certainly not dependent upon the stage above low

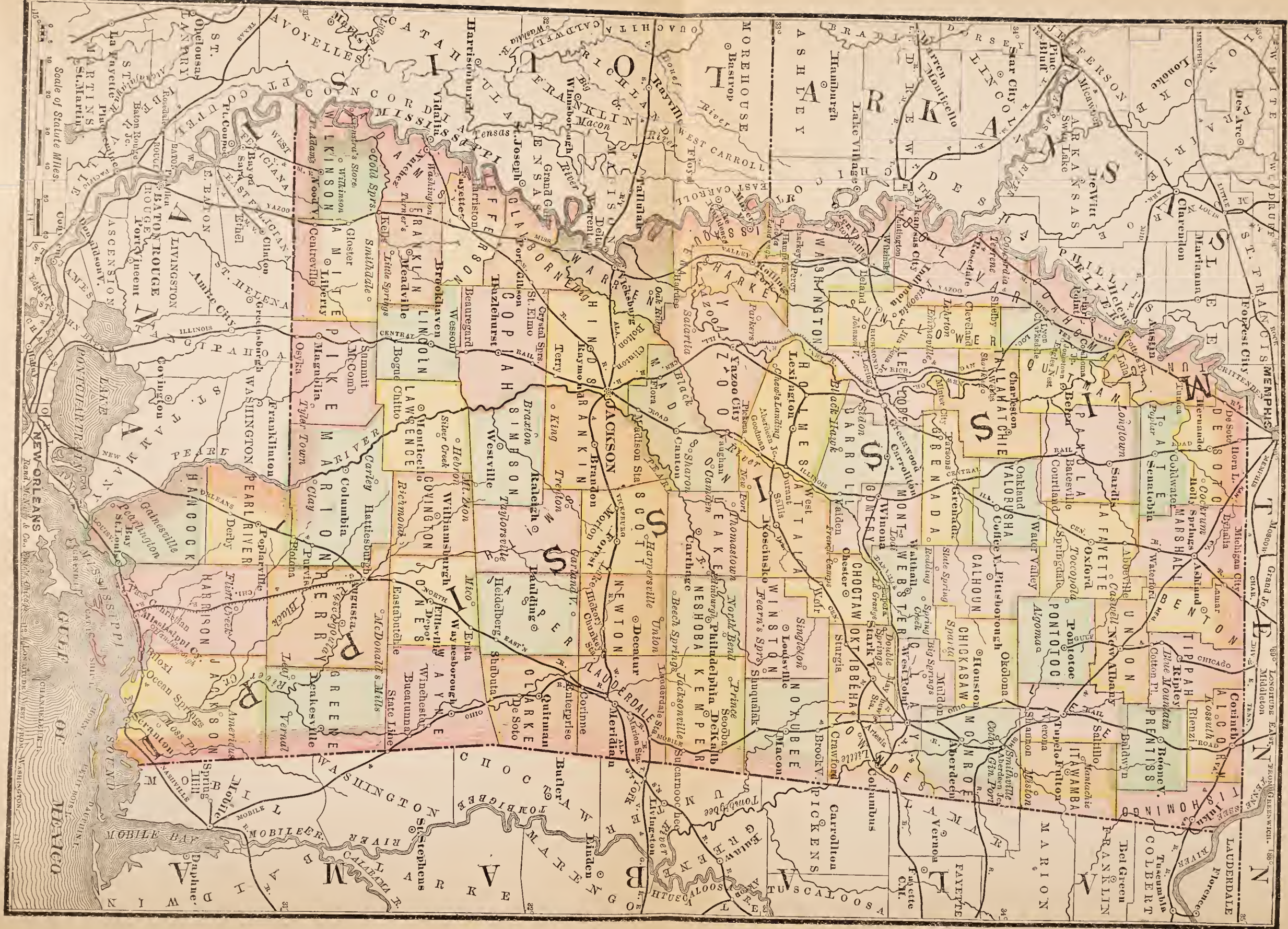
water. It is chiefly determined by the tributary whence the water proceeds, but is also influenced by the caving of the banks, which is always excessive when the river is rapidly falling after the spring flood. In long periods the sedimentary matter is to the water by weight nearly as 1 to 1,500, and by bulk as 1 to 2,900. The amount held in suspension and annually contributed to the Gulf constitutes a prism one mile square and 263 feet high. In addition to this amount a large volume, estimated at one mile square and twenty-seven feet high annually, is pushed by the current along the bottom and thus transported to the Gulf.

The mean annual succession of stages for long periods is quite uniform, but so many exceptions are noted that no definite prediction can safely be made for any particular epoch. The river is usually lowest in October. It rises rapidly until checked by the freezing of the northern tributaries. It begins to rise again in February, and attains its highest point about April 1st. After falling a few feet it again rises until, early in June, it attains nearly the same level as before. After this it rapidly recedes to low water mark. As a rule the river is above mid-stage from January to August inclusive, and below that level for the remainder of the year.

It has been established by measurement and observation that the great bottom lands above Red River before the construction of their levees did not serve as reservoirs to diminish the maximum wave which passed through Louisiana in great flood seasons. They had already become filled by local rains and by water escaping into them from the Mississippi through numerous bayous, so that at the date of highest water the discharge into the river near their southern borders was fully equal to the volume which the wave had lost in passing along their fronts.

In fine, the investigations between 1850 and 1860 established that no diversion of tributaries was possible; that no reservoirs artificially constructed could keep back the spring freshets, which caused the floods; that the making of cut-offs, which had sometimes been advocated as a measure of relief, so far from being beneficial, was in the highest degree injurious; that, while outlets within proper limits were theoretically advantageous, they were impracticable from the lack of suitable sites; and, finally, that levees properly constructed and judiciously placed would afford protection to the entire alluvial region.

During the civil war (1861-65) the artificial embankments were neglected; but after its close large sums were expended by the States directly interested in repairing them. The work was done without concert, upon defective plans, and a great flood early in 1874 inundated the country, causing terrible suffering and loss. Congress passed an act creating a commission of five engineers to determine and report on the best system for the permanent reclamation of the entire alluvial region. Their report, rendered in 1875, endorsed the conclusion of that of 1861, and advocated a general levee system on each bank. This system comprised—(1) a main embankment raised to specified heights sufficient to restrain the floods; and (2), where reasonable security against caving required considerable areas near the river to be thrown out, exterior levees of such a height as to exclude ordinary high waters but to allow free passage to great floods which as a rule only occur at intervals of five or six years. The back country would thus be securely protected, and a safe refuge would be provided for the inhabitants and domestic animals living upon the portion subject to occasional overflow. An engineering organization was proposed for constructing and maintaining these levees, and



detailed topographical survey was recommended to determine their precise location. Congress promptly approved and ordered the survey; but strong opposition on constitutional grounds was raised to the construction of the levees by the government.

In the meantime complaints began to be heard respecting the low-water navigation of the river below the mouth of the Ohio. Forty-three places above the mouth of Red River afforded depths of less than ten feet, and thirteen places depths less than five feet, the aggregate length of such places being about 150 miles. A board of five army engineers, appointed in 1878 to consider a plan of relief, reported that ten feet could probably be secured by narrowing the wide places to about 3,500 feet with hurdle work, brush ropes, or brush dykes designed to cause a deposit of sediment, and by protecting caving banks, when necessary, by such light and cheap mattresses as experience should show to be best suited to the work. Experiments in these methods were soon begun upon the river above Cairo, and have since proved of decided benefit.

In June, 1879, Congress created a commission of seven members to mature plans to correct, permanently determine, and deepen the channel, to protect the banks of the river, to improve and give safety to navigation, to prevent destructive floods, and to promote and facilitate commerce. Up to 1882 appropriations amounting to \$6,425,000 were made to execute the plans of this commission, but with provisos that none of the funds were to be expended in repairing or building levees for the protection of land against overflow, although such levees might be constructed if necessary to deepen the channel and improve navigation. Acting under this authority, the commission have allotted considerable sums to repair existing breaks in the levees; but their chief dependence is upon contracting the channel at low water by promoting lateral deposits, and upon protecting the high-water banks against caving by mats of brush, wire, etc., ballasted where necessary with stone—substantially the plans proposed by the army board of 1878.

The bars at the efflux of the passes at the mouth of the Mississippi have long been recognized as serious impediments to commerce. The river naturally discharges through three principal branches, the southwest pass, the south pass, and the northeast pass, the latter through two channels, the most northern of which is called Pass à l'Outre. The ruling depth on the several bars varies with the discharge over them, which in turn is controlled by the successive advances of the passes. In the natural condition the greatest depth does not exceed twelve or thirteen feet. The first appropriation by Congress to secure increased depth was made in 1837, and was expended in an elaborate survey and in a system of dredging by buckets, but the plan of a ship canal was also discussed. At the next appropriation, made in 1852, a board of officers, appointed by the war department, recommended trying in succession—(1) stirring up the bottom by suitable machinery, (2) dredging by buckets, (3) constructing parallel jetties five miles long at the southwest pass, to be extended as found necessary, (4) closing lateral outlets, and (5) constructing a ship canal. A depth of eighteen feet was secured by the first plan, and was maintained until the available funds were exhausted. Under the next appropriation (1856) an abortive attempt was made to apply the plan of jetties to the southwest pass. This failed from defects in execution by the contractors, but a depth of eighteen feet was finally secured by dredging and scraping. The report of 1861 discussed the subject of bar formation at length. Although it approved the plan of jetties and closure of outlets as correct in theory, the

stirring up of the bottom by scrapers during the flood stages of the river (six months annually) was recommended by it as the most economical and least objectionable. After the war this recommendation was carried into effect for several years with improved machinery, giving at a moderate annual cost a depth at times reaching twenty feet at extreme low water, but experience indicated that not much more than eighteen feet could be steadily maintained. This depth, entirely satisfactory at first, soon became insufficient to meet the growing demands of commerce, and in 1873, Major Howell, the engineer in charge, revived the project of a ship canal. The subject was discussed carefully by a board of army engineers, the majority approving a ship canal. In 1874 Congress constituted a special board which, after visiting Europe and examining similar works of improvement there, reported in favor of constructing jetties at the south pass, substantially upon the plan used by Mr. Caland at the mouth of the Meuse; and in March, 1875, Capt. J. B. Eads and associates were authorized by Congress to open by contract a broad and deep channel through the south pass upon the general plan proposed by this board. This contract called for "the maintenance of a channel of 30 feet in depth and 350 feet in width for twenty years" by "the construction of thoroughly substantial and permanent works by which said channel may be maintained for all time after their completion." The jetties were to be not less than 700 feet apart. The sum of \$5,400,000 was to be paid for obtaining this channel, and \$2,100,000 for maintaining it for twenty years. In addition, the contractors were authorized to use any materials on the public lands suitable for and needed in the work. The south pass was twelve and nine-tenths miles long. It had an average width of 730 feet and a minimum interior channel depth of 29 feet. The distance from the thirty-foot curve inside the pass across the bar to the thirty-foot curve outside was 11,900 feet. The minimum depth at average flood tide on the bar was about eight feet. The discharge at the mouth was about 57,000 cubic feet of water per second, transporting annually about 22,000,000 cubic yards of sediment in suspension to the Gulf. A small island and shoal existed at the head of the pass, the channel there having a minimum depth of seventeen feet. The work was begun on June 2, 1875, and has been so far successful that during the year ending June 30, 1882, a channel was maintained having a least depth of thirty feet between the jetties and extending through the bar. Its least width was twenty feet, the average being 105 feet. The twenty-six foot channel had a least width of 200 feet, except for a few days. In the pass itself the twenty-six foot channel had a least width of fifty feet. (See JETTIES, *ante*.)

MISSISSIPPI, one of the Southern States of the American Union, derives its name from the river which for more than 500 miles forms its western boundary between the 35th and 31st parallels of north latitude, separating it from Arkansas and Louisiana. The boundary with the latter State is continued along the 31st parallel, for 110 miles, to the Pearl river, and then down the Pearl to its mouth. The Gulf of Mexico, eastward from the mouth of Pearl river, completes the southern boundary. On the north the 35th parallel, from the Mississippi river to the Tennessee, separates the State from Tennessee, and the boundary then follows the latter river to the mouth of Bear creek. The eastern boundary of the State, separating it from Alabama, follows a line drawn from the mouth of Bear creek about seven degrees west of south to what was "the northwestern corner of Washington county on the Tombigbee," and thence due south to the Gulf of

Mexico. Ship, Horn, Cat, and Petit Bois Islands, and those nearer the shore, form a part of Mississippi. The extreme length of the State, north and south, is 330 miles, and its maximum breadth is 188 miles. Under the United States surveys, begun in 1803, the State has been divided into townships and sections, except such parts as were at the first owned by individuals. The area of the State is 46,340 square miles.

There are no mountains in Mississippi, but a considerable difference of level exists between the continuously low, flat, alluvial region lying along and between the Mississippi and Yazoo rivers, called "the Bottom," and nearly all the remainder of the State, which is classed as upland. The latter part, comprising five-sixths of the whole, is an undulating plateau whose general elevation above the water of the Gulf of Mexico increases to 150 feet within a few miles of the coast, and varies elsewhere from 150 to 500 or 600 feet. Some exceptional ridges are probably 800 feet high. The streams of this region flow in valleys varying in width from a few hundred yards to several miles. The fall of each river is not great, and is quite uniform. Usually a considerable part of the valley of each larger stream is several feet above its present high water mark, and forms the "hommock," or "second bottom" lands. On some of the rivers the lowest part of the valley, subject to overflow, is several miles in width, and bears a resemblance to the Mississippi Bottom.

Ridges or plateaus everywhere in the upland region divide the contiguous basins of creeks and rivers, descending more or less abruptly to their valleys. In the northeastern part of the State, almost level prairies cover large areas overlying a Cretaceous formation called Rotten Limestone.

A line of abrupt bluffs, extending southward from the northwest corner of the State, divides the upland region from the Bottom, where the general surface lies below the high-water level of the Mississippi river. A few long ridges, running north and south, and embracing about 200,000 acres, are barely above high water. The cultivated lands in the Bottom lie on these, and on the borders of the rivers and the numerous lakes and bayous, where the surface is slightly elevated. Low swamps or marshes, in which flourish large cypress trees, lie between the streams, and frequently receive the surface drainage from their banks. Large forest trees and dense cane-brakes occupy the drier ground. The Mississippi river is prevented from flooding the Bottom during high water by a system of levees or embankments built by a fund derived partly from taxation on the land and partly from the proceeds of the sale of public lands in the State classed as "swamp lands," which were given over for this purpose by Congress. The only compensation for the injury done when breaks in the levees ("crevasses") occur is the deposit of alluvial matter left by the overflow, which adds to the productiveness of the already wonderfully fertile soil. The present levee system usually protects about one-fourth of the 4,000,000 acres in the Bottom. Many crescent-shaped lakes ("cut-offs") occur in the Bottom. Similar phenomena present themselves in the channels of the other rivers having wide bottoms.

The volume of water in the streams varies greatly during the year, and is usually largest between the months of January and April. During high water all the larger streams are navigable by steamboats. These ply upon the Mississippi, Tennessee, and Yazoo rivers throughout the whole year. The rivers flowing into the Gulf are much obstructed by sand bars, and are chiefly used for floating logs to the saw-mills on the coast.

The best and only deep harbor on the coast is the well-protected roadstead inside of Ship Island. It has a depth of twenty-seven feet, a firm clay bottom, and is readily accessible to lighters from the shallower harbors along the coast.

Near the waters of the Gulf of Mexico the climate is much milder than in the northern parts of the State. On the southern borders the temperature rarely falls to 32° Fahr., or exceeds 95°, the annual mean being about 68°. The orange, lemon, almond, banana, and olive can be grown without protection. In the latitude of Vicksburg the temperature ranges from 98° to 20°, very rarely lower; the annual mean is 65°. The range in the northern part of the State is from 98° to 15°, or rarely 10°, and the annual mean is 61°. The first and last hoar-frosts occur, in the central parts of the State, usually in the latter parts of October and March. The ground is seldom frozen to the depth of three inches, and only for a few days at a time. The rainfall on the coast is sixty to sixty-five inches per annum, and at the northern boundary fifty inches. While about two-thirds of this precipitation occurs in winter and spring, a month seldom passes without several inches of rainfall.

Land and sea breezes in the south, and variable winds elsewhere, make the heat of summer tolerable. In healthfulness Mississippi compares favorably with other States. Where the surface is flat and poorly drained malarial fevers are prevalent during the warm season. Yellow fever has become epidemic after importation, but strict quarantine has been successful in preventing it.

The geological structure of the State is comparatively simple, and closely related to that of the adjacent States. The older formations are nearly all overlaid by deposits of the Quaternary period. In the extreme northeastern portion are found the oldest rocks in the State—an extension of the Subcarboniferous formation which underlies the Warrior coal-fields of Alabama. The strata here show some traces of the upheaval which formed the Appalachian mountain chain, whose southwest termination is found in Alabama. When this chain formed the Atlantic mountain-border of the continent, excepting this northeast corner, Mississippi had not emerged from the waters of the ancient Gulf of Mexico. As the shoreline of the Gulf slowly receded southward and westward, the sediment at its bottom gradually came to the surface, and constituted the Cretaceous and Tertiary formations of this and adjacent States.

Metallic ores are not found in Mississippi in paying quantities. The only valuable minerals are sandstones and limestones, marls, sands, lignite or brown coal, and fire-clays. None of these have been extensively brought into market. Potable water is found almost everywhere. Mississippi affords perhaps no species of fauna not found in the neighboring States. There are thirty or forty species of *Mammalia*, the most remarkable being the American opossum, still quite abundant. The deer (*Cervus virginianus*), black bear (*Ursus americanus*), wolves (*Canis lupus* and *Lupus americanus*), catamount (*Felis concolor*), and wild-cat (*Lynx rufus*) have much decreased in number, and may, like the buffalo and elk, shortly become extinct. About 150 species of birds are found during at least part of the year. Many are seen only *in transitu*, and about twenty species from the north spend the winter here. The mocking bird (*Mimus polyglottus*), the most remarkable songster, is very abundant. The wild turkey (*Meleagris gallipavo*) survives by virtue of its wary and watchful character. Over fifty species of *Reptilia* have been found, prominent among which is the alligator (*A. mississippiensis*), which attains a length of twelve or fifteen feet, and is common in the southern river bottoms. The rattlesnake, moccasin, and copper-

head, venomous serpents, are numerous. About half of the sixty-three species of fish abounding in the fresh and salt waters of the State are valuable for food. The edible oysters and crustaceans of the coast are remarkably fine.

Originally nearly the entire State was covered with a growth of forest trees of large size, mostly deciduous. The undergrowth was kept down by annual burnings by the natives, and the ground became carpeted with grasses and herbs. Over 120 species of forest trees are found; many valuable ones are abundant, and their timber constitutes a large item in the resources of the State.

Agriculture is the leading industry in Mississippi. Over 400,000 of the population are directly engaged in the cultivation of 5,895,000 acres of land. The character of the soil is varied, and all is productive, except that in the Flatwoods region and in the district covered with long-leaved pine, where only the valleys are fertile. At least half the State is exceptionally fertile. Not more than one-fourth of the arable land has been brought into cultivation, and two millions of acres of the best lands in the State, lying in the Bottom, might be made arable by proper drainage.

Cotton is the chief agricultural product. The crop of 1887 amounted to 1,062,797 bales, worth \$43,872,620. There were produced also of cotton seed 28,000,000 bushels, worth \$3,000,000; of Indian corn, 32,633,000 bushels; of oats, 4,410,000 bushels; of wheat, 313,000 bushels; of rice, 1,718,950 pounds. Small quantities of rye, barley, molasses, and tobacco, and abundant crops of potatoes, yams, peas, and all garden vegetables, are annually produced.

Fruits of various kinds flourish in many parts of the State, and, with early vegetables, are largely shipped to the northern markets in spring and early summer. The value of the cotton crop is about three times as great as that of all the other products of the soil, which are sometimes insufficient for home consumption. Economically this specialization of agriculture is to be regretted; but successful efforts are being made to diversify it by growing other crops to which the soil and climate are equally well suited.

The principal articles manufactured are lumber, cotton and woollen goods, cotton-seed oil, and agricultural implements.

The number of inhabitants according to the different census returns from 1850 to 1880 is given in the following table:—

CENSUS.	Total.	White.	Colored.	Density per Sq. Mile.
1850	606,526	295,718	310,808	13.09
1860	791,314	353,910	437,404	17.07
1870	829,609	384,549	445,060	17.9
1880	1,131,592	479,371	652,221	24.42

Of the colored population, mostly freedmen and their descendants, 1,738 were Indians or half-breeds in 1880, and about 60,000 mulattoes. The whites own nearly all the farms and other real property. The total property valuation in the State decreased from \$607,324,911 in 1860 to \$209,197,345 in 1870, on account of the losses in war and the liberation of the slaves. There has been, however, a rapid increase in the last decade. The towns in the State have small populations; Vicksburg 13,373 inhabitants, Natchez 10,101, Meridian 10,889, and Jackson, the State capital, 10,039. The population of the State in 1890 amounted to 1,289,600.

The three departments, legislative, executive, and judiciary, are similar to those of other States. The governor and other executive officers are elected for

four years. The legislature, which meets biennially, is composed of forty senators, serving four years, and 120 representatives, serving two years. These are apportioned to the seventy-four counties according to population, and elected by the people. The judiciary officers, consisting of three justices of the supreme court, twelve circuit judges, and twelve chancellors, are appointed by the governor with the consent of the senate. One attorney-general and twelve district attorneys are elected by the people. The state maintains a public school system, with separate schools for the two races, besides a State university and other schools of high grade for each of the races.

The nominal debt of the State is \$2,935,258, but if the amounts held by the Chickasaw and Common School funds are deducted the net debt is only about \$750,000. The receipts of the State treasury were \$1,069,568 and the expenditures \$1,029,638. The taxable property as assessed was: Real estate, \$87,282,254; personal, \$38,454,384—total, \$125,736,638. The rate of State tax was 35 cents on the \$100.

Mississippi was first visited by Europeans in 1540, when the adventurous expedition of De Soto reached its northern parts. After the disastrous termination of this expedition no other Europeans visited this region until 1673, when Joliet and Père Marquette descended the Mississippi to latitude 33°. In 1682 La Salle and Tonty descended to the mouth of the river, and claimed the whole region drained by it for the king of France, giving it the name Louisiana. In 1699 the first colonists reached the coast of Mississippi, sent from France under Iberville. Settlements were made on Ship Island and Cat Island, and upon the mainland on the eastern side of Biloxi Bay, at Bay St. Louis, and at Mobile. The colony did not prosper, and in 1712 Anthony Crozat obtained by charter from the king all the commercial privileges of the lower Mississippi valley. Under his management the colony languished, and in 1717 the king accepted the surrender of his charter, and granted another with more extended privileges to the "Western Company," or "Mississippi Scheme," with John Law as director-general, and Bienville as governor of the colony. Under this management the rich alluvial lands on the Mississippi river began to be occupied; tobacco, rice, and indigo were cultivated, and African slaves were introduced. Settlements were made near the present city of Natchez in 1720. Two years later, Law's company becoming bankrupt, much embarrassment in the colony followed, and troubles also began with the natives. On November 28, 1729, the Natchez Indians surprised and murdered about 200 of the white male residents, and made captives of about 500 women and children and negroes. A war followed, resulting in the destruction of the Natchez tribe. The representatives of the "Western Company" returned their franchises to the king in 1732, the number of colonists and slaves being then about 7,000. After two unsuccessful campaigns against the Chickasaw Indians in the northern part of what is now Mississippi, Bienville was superseded by the Marquis de Vaudreuil in 1740.

By the treaty of Paris, in 1763, France ceded all her possessions east of the Mississippi river to England, excepting the island of New Orleans, ceded to Spain. The British province of West Florida at first extended eastward from the Mississippi river along the Gulf coasts, with its northern limit at the thirty-first parallel of north latitude. Soon afterward the northern boundary was fixed at a line drawn eastward from the point where the Yazoo river unites with the Mississippi.

Under British rule the Natchez country, which had been deserted since the massacre of 1729, and the southern part of the present State of Mississippi, rapidly

filled with settlers, many of them emigrants from the Atlantic colonies. Cotton, indigo, and sugar were cultivated, and negro slaves continued to be freely introduced. During the revolutionary war of the Atlantic colonies, West Florida, being far removed, remained undisturbed until 1779. Spain and England being then at war, Galvez, the governor of New Orleans, aided by sympathizers with the revolutionary colonists, took possession of the whole of West Florida for the king of Spain. At the peace of 1783 England acknowledged the thirty-first parallel as the southern boundary of the United States, and ceded West Florida to Spain. The district between the thirty-first parallel and the parallel through the mouth of the Yazoo was therefore claimed by the United States and by Spain, the latter being in possession. After tedious negotiations the latter power relinquished the district in March, 1798, and Congress at once formed it into "the Mississippi Territory," which extended from the Mississippi river eastward between the two above-mentioned parallels of latitude to the Chattahoochee river.

The State of Georgia claimed as a part of its domain all of the district east of the Mississippi river, and between the 31st and 35th parallels. In 1802 it ceded its claims to the Federal Government for certain considerations, and in 1804 Congress extended the limits of the Mississippi Territory northward to the 35th parallel. Nearly all of the Territory was then owned by the native Indians. The Choctaws occupied the southern part, and the Chickasaws the northern part of what is now the State of Mississippi. In 1812 the United States troops occupied Spanish West Florida, and the district east of Pearl river and south of latitude 31° was added to the Mississippi Territory. The Territory was divided by the present line between Alabama and Mississippi, and the State of Mississippi admitted into the Union in 1817. In 1830-32 the native tribes exchanged their lands for others west of the Mississippi river and were nearly all removed, and a rapid influx of settlers followed. In January, 1861, the State seceded from the Federal Union, and, joining the Southern Confederacy, furnished a large number of troops during the civil war. It was the field of many important campaigns, and suffered great losses. Exhausted by the conflict, and harassed by processes of political reconstruction, the State was in a deplorable condition for several years. But within the last twenty years an era of prosperity commenced, marked by a large increase in population and great activity in agricultural and other pursuits.

MISSOLOGHI, or MESOLOGHI, a city of Greece, the chief town of the nomarchy of Acarnania and Ætolia, situated on the north side of the Gulf of Patras, about seven miles from the coast, in the midst of a shallow lagoon, with a population of 6,324 in 1879, is notable for the siege of two months which Mavrocordatos with a handful of men sustained in 1821 against a Turkish army 11,000 strong, and for the more famous defense of 1825-26. Byron died there in 1824, and is commemorated by a cenotaph.

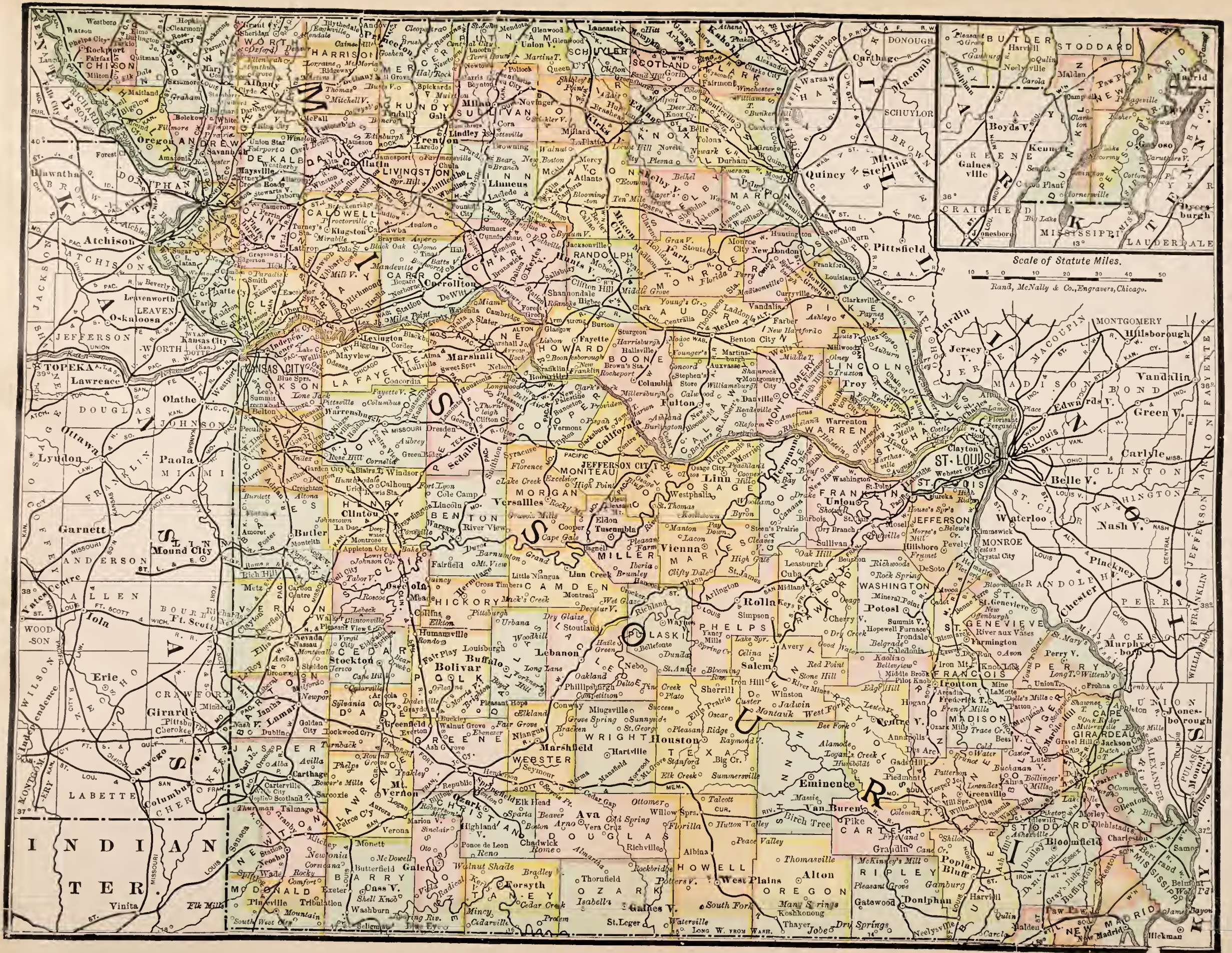
MISSOURI, a central State of the American Union, lying almost midway between the Atlantic and the Rocky Mountains, British America, and the Gulf of Mexico. Its eastern boundary is the Mississippi, separating it from Illinois, Kentucky, and Tennessee. North and south its boundaries with Iowa and Arkansas respectively are mainly coincident with the parallels of $40^{\circ} 30'$ and $36^{\circ} 30'$ N. latitude; but a small peninsula between the Mississippi and St. François rivers stretches thirty-four miles farther south between Arkansas and Tennessee. The western border, with Nebraska, Kansas, and the Indian Territory, is nearly

coincident with the course of the Missouri to the junction of that stream with the Kansas, and then follows the meridian of $17^{\circ} 40'$ W. of Washington. The area of the State is 68,375 square miles, the extreme length from north to south 282 miles, the extreme width 348 miles. Missouri is divided into a northern and southern portion by the Missouri river, flowing 400 miles in a generally easterly direction from its junction with the Kansas to the point twelve miles above St. Louis where it unites with the Mississippi. Northern Missouri has a surface broken and hilly, but not mountainous. It is mainly prairie land, well watered by streams, and fit for agriculture; but there is a good deal of timber in the eastern parts, especially along the bold bluffs of the two great rivers. Southern Missouri is almost equally divided between timber land in the east and prairie in the west. In its southwestern portion rises the table-land of the Ozark hills (highest point 1,600 feet above the sea). The Osage, the Gasconade, and other streams flow northward and eastward into the Missouri. The southeastern lowlands form an undulating country, readily drained after rain, with fertile ridges generally running north and south, occasional abrupt isolated hills, forests of oak, hickory, elm, maple, ash, locust, willow, persimmon, pecan, chestnut, and cherry trees, and in the lowest parts swamps and morasses.

The climate of Missouri, lying, as it does, far from the ocean and unprotected by mountain ranges, is one of extremes in heat and cold, moisture and drought. The Ozark range is high enough to influence the climate locally, but not to affect that of the whole State. The mean summer temperature ranges from 75° in the northwest of the State to 78.5° in the southeast; but the thermometer has been known to rise to 104° . The winter temperature averages 33.87° for the whole State, varying from 28.5° in the northwest to 39.5° in the southeast. In some winters the temperature hardly falls to zero; in others 20° below zero have been registered. The Mississippi at St. Louis freezes over once in four or five years; but this is partly caused by the accumulations of floating ice coming down from the north. The river has closed as early as the first week in December, and, again, has remained open until the last week in February. It is in cold seasons sometimes passable for the heaviest teams. The Missouri river is often closed during the whole winter. The mean annual temperature of the State varies from 53° to 58° . The climate is, on the whole, dry; for, in spite of the abundant rains, especially in the spring, evaporation is so rapid that the atmosphere is rarely overloaded with moisture. April is the driest month. The greatest amount of rain falls in the southeastern part of the State. An unusual amount of fair weather, prevailing clearness of sky, general salubrity of soil and climate, are chief among the natural advantages of this great State.

The exposed coal in Missouri includes upper, middle, and lower measures. In the first are about four feet of coal, and the area of exposure is about 8,400 square miles. The middle coal measures contain about seven feet of coal, and cover an exposed area of about 2,000 square miles. The lower measures have five workable seams, varying from eighteen inches in thickness to four and a half feet, and also some thin seams of only a few inches. The Missouri coal mines are easily worked.

The iron ores are red hematite, red oxide, specular iron, brown hematite or limonite, and clay ironstone. Manganiferous and siliceous specular ores occur in the porphyries of the Archæan rocks and in the granites. The greatest exposure of specular iron yet discovered is Iron Mountain, the purest mass or body of iron ore known. Analysis shows it to contain from sixty-five to sixty-nine



per cent. of metallic iron. The ore of Shepherd Mountain is not so rich as that of Iron Mountain, but is uniform in character, free from sulphur and phosphoric acid, and on the whole superior to any other yet developed in Missouri. Pilet Knob ore gives fifty-three to sixty per cent. metallic iron, and has few deleterious substances. It is fine-grained, light bluish gray in color. The ore of the Scotia iron banks and Iron Ridge are much alike in appearance and character, being specular boulders imbedded in soft red hematite. In some of these boulders are cavities in which the ore has taken botryoidal form, and upon these peroxide of iron crystallizations are so formed that a gorgeous show of prismatic colors is presented. The above are the chief deposits of iron ores, but limonites are found mostly in the southern parts of the State. The counties of Ste. Genevieve, Madison, St. François, Cape Girardeau, Bollinger, Wayne, Stoddard, Washington, Reynolds, Shannon, Carter, and Ripley have the greatest exposures of these ores, although they are found in many others. The supply of iron ores, is, indeed, practically inexhaustible.

Second only to iron among the metals of Missouri is the vast deposit of lead found in the southern parts of the State. The great disseminated lead region occupies about one-half of the northern portion of Madison, and about as much of St. François county. It is in the magnesian limestone that the largest quantities have been found. In Franklin county galena is found in abundance in ferruginous clay and coarse gravel. In the great mammoth mine in Washington county is a succession of caves in which millions of pounds of lead were found adhering to the sides and roofs. The central lead district of the State comprises the counties of Cole, Cooper, Moniteau, Morgan, Miller, Benton, Maries, Camden, and Osage; the southern lead region the counties of Pulaski, Laclede, Texas, Wright, Webster, Douglas, Ozark, and Christian. The western lead district includes the counties of Hickory, Dallas, Polk, St. Clair, Cedar, and Dade; the southwestern the counties of Jasper, Newton, Lawrence, Stone, Barry, and McDonald. The two counties, Jasper and Newton, produce fully one-half of the pig lead of Missouri. The lead mines of Granby are among the best known in the State, and millions of pounds of lead have been taken from these lands.

Copper deposits have been found in several counties, chiefly in the southwestern part of the State. Zinc is found, in the shape of sulphuret and also silicate of zinc, in nearly all the lead mines in southwestern Missouri. It has often occurred in such masses as seriously to hinder mining operations, and until very recent years, when railroad facilities have given this ore a market, it was thrown aside as worthless. It is now an important and profitable adjunct of the lead mines of Missouri. Cobalt and nickel are found at Mine La Motte and in a few other places. Silver is found in small quantities in lead mines in Madison county, combined with the lead.

Clays for the manufacture of ordinary brick for building purposes and for fire-brick exist in quantities beyond computation, and kaolin has been found in a few places. Marble of various shades and qualities abounds in Missouri, and is an important item in its mineral wealth. Limestones and sandstones suitable for building purposes are found in many parts of the State.

Indian corn, wheat, oats, and tobacco are the staple products; but cotton, hemp, and flax are also raised to some extent in the southern counties. The average yield of wheat to the acre is thirty bushels, and that return is often exceeded. No flour is of a higher quality or more in demand in foreign as well as home markets than that made from Missouri wheat. Indian

corn is especially used in fattening live stock. Blue grass, timothy, red-top, and red and white clover grow luxuriantly, and favor stock-raising. In some parts of the State pasturage can be had all the year round, and the cheapness of corn makes the raising of pork, in particular, a very profitable business. All varieties of fruit can be very successfully cultivated. The more tender fruits, such as apricots, nectarines, figs, and many choice kinds of grapes, grow here as well as the more northern fruits—the apple, the pear, the plum, and the cherry. Apples and peaches do well in all parts of the State. Six native varieties of grapes are found in luxuriant growth, and many cultivated varieties have been successfully introduced. No State, not even California, can hope ultimately to rival Missouri in the production of both red and white wines. Sheep-raising has proved remunerative in the southern counties chiefly, where the mild climate, the fine grasses, and the abundance of good water are especially favorable to this branch of agricultural industry.

Missouri is the fourth State in the Union in the number of its farms, being credited in 1880 with 215,575. It stands third in the number of acres of improved land, having 16,745,031 acres under cultivation. The value of Missouri farms, including land, fences, and buildings, reached the sum of \$375,633,307 in 1880. The value of its live stock is given in the United States census returns as \$95,785,282. The estimated value of all its farm productions, sold, consumed, or on hand, for the year 1879, was officially declared to be \$95,912,660.

In 1889 there were on the farms in the State 797,746 horses, 227,819 mules and asses, 9,020 oxen, 737,259 cows, 1,410,507 other cattle, 1,109,444 sheep, and 5,200,000 swine. The cattle, sheep, and hogs were valued in 1889 at \$50,819,697. Missouri supplies more wine than any State except California, and is a rival of Kentucky, Virginia, Tennessee, and Maryland in the culture of tobacco, which is a staple in the rich counties in the northern central part of the State, bordering upon the Missouri river. No State raises so many mules, asses, and hogs. The United States department of Agriculture furnished the following returns for 1887:

PRODUCTS.		Acres.	Value.
Indian corn.....bushels	140,949,000	6,406,785	\$52,151,130
Wheat	27,744,000	1,712,603	17,201,280
Rye..... "	537,000	47,551	241,650
Oats..... "	39,793,000	1,358,119	10,346,180
Barley..... "	160,000	8,795	80,000
Buckwheat..... "	69,000	7,214	46,920
Potatoes..... "	5,030,000	83,833	3,118,600
Tobacco.....pounds	6,421,000	12,842	642,100
Hay.....tons	1,767,150	1,472,625	14,508,302
Total.....		11,110,367	\$98,336,162

Red deer are found in every part of the State, especially in the thinly-settled and mountainous districts. Venison, indeed, in its season, is as cheap as good beef in the markets of St. Louis. Wild turkeys are numerous in the swampy and mountainous districts, and are found in all parts of the State. Prairie chickens, or pinnated grouse, are found in the prairie portion of Missouri, and are shipped in great numbers to Eastern markets. In all parts of Missouri are found the quail or Virginia partridge, thousands of barrels of which are shipped from the State each season. The rabbit, a species of hare, is so common as to be considered a pest. The gray squirrel and the red fox-squirrel are also found in large numbers all over the State. Black bass, perch, catfish, buffalo fish, suckers, and pike are the leading varieties of native fish.

In 1880 Missouri had about 20,000 manufacturing establishments, in which a capital of about \$125,000,000 was employed. The products of these establishments were valued at upward of \$300,000,000. The leading manufacturing counties outside of the city of St. Louis are Jackson, Buchanan, St. Charles, Marion, Franklin, Greene, Cape Girardeau, Platte, Boone, and Lafayette; but more than three-fourths of the manufactures are produced at St. Louis. The chief manufacture is that of flour, which employs about 900 mills, and is rapidly increasing. The iron industry, which stands second in importance, is yet only in its infancy, and St. Louis seems to be destined to be one of the great centers of iron and steel manufacture.

The extensive commerce of Missouri centers at St. Louis, between which city and the ports on the Mississippi and Missouri rivers steamboats are constantly plying. Railroad transportation has, in recent years, furnished superior and cheaper facilities for much of the trade which formerly depended upon the rivers. The trade in cotton especially has been greatly increased in Missouri since 1870 by the use of railroad transportation, which has made St. Louis one of the great cotton centers of the United States. Extensive cotton presses were built in St. Louis in that year, and the receipts of cotton from the more southern States have increased rapidly. Railroad connections have made the interior portions of Arkansas and Texas more accessible to St. Louis than to the southern ports of shipment, and the trade with the southwest, with the Indians, and with Mexico is constantly increasing. In 1870, St. Louis was made by act of Congress a port of entry to which foreign merchandise could be brought in bond.

Missouri is divided into 114 counties. The following table gives the number of inhabitants from 1850 to 1880:

Year.	Males.	Females.	Total.	Density per square mile.
1850	357,832	324,212	682,044	14.37
1860	622,201	559,811	1,182,012	18.08
1870	896,347	824,948	1,721,295	26.34
1880	1,127,187	1,041,193	2,168,380	31.55

The census of 1890 gives the population as 2,679,184. The early settlers of the State were French, and their descendants are still found in St. Louis and Ste. Genevieve and a few other smaller towns. Many Germans have recently settled in all parts of the State, while English, Irish, Scotch, and Swedes have also made Missouri their home in considerable numbers. The native American population is mostly descended from immigrants from the States of Kentucky, Tennessee, North Carolina, and Virginia. During recent years there has been a large accession to the population from the eastern and northwestern States.

St. Louis, the chief city of the Mississippi valley, situated upon the Mississippi river about twelve miles below the mouth of the Missouri, has a population of 460,357; Kansas City, 132,716; St. Joseph, 52,324; Hannibal, 12,857, and Jefferson City (the State capital), 6,732.

Missouri has a public school system of education first adopted in 1839. There are district schools, elementary and ungraded; city schools, graded, with high school courses; four normal schools, and a State university. Free public schools for white and colored children between the ages of six and twenty years are required by law for every district in the State. Besides these public institutions supported by the State there are many private schools and colleges for both sexes. Chief among these are the St. Louis University, an institution

managed by the Jesuits; the College of Christian Brothers, also under the control of the Roman Catholics; and Washington University, a non-sectarian endowed school, which has property estimated at \$1,000,000, and more than 1,300 students. The Baptists have a college at Liberty called William Jewell College; the Congregationalists one at Springfield called Drury College; and the Methodists and Presbyterians several colleges and seminaries.

The receipts for school purposes in the year ending July 1, 1888, were \$5,851,714, which included \$1,110,419 brought over from the previous year. The expenditures for all purposes were \$4,647,205, leaving a balance of \$1,204,508 on hand. The permanent school fund was made up as follows:

Certificates of indebtedness at 6 per cent.....	\$2,909,000 00	
Certificates of indebtedness at 5 per cent.....	225,000 00	
In treasury to credit of State School fund.....	2,206 74	
Total amount to credit of the "State School fund".....		\$3,136,206 74
University or "Seminary fund".....		535,000 00
County Public School fund.....		3,529,300 13
Township Public School fund.....		2,113,409 36
Special Public School fund.....		1,417,328 38
Total.....		\$10,731,244 61

The number of white children enrolled was 577,335 and of colored children 33,215, and there was an average daily attendance of 377,502. There were 9,819 schools, with school property valued at \$9,803,786.

The legislative power is vested in a body consisting of a senate and a house of representatives, which meets once in every two years, on the Wednesday after the first day of January next after the election of the members thereof. Members of the legislature are paid a sum not to exceed \$5 a day for the first seventy days of the session, and after that not to exceed \$1 a day for the remainder of the session. They are also allowed mileage. The executive department consists of a governor, a lieutenant-governor, a secretary of state, a state auditor, state treasurer, an attorney-general, and a superintendent of public instruction; these are all elected by the people. The supreme executive power is vested in the governor, who is chosen for four years, as also are the other members of this department. The governor has a qualified veto upon the acts of the legislature, and such other powers as are common to that officer in the several States. Executive and judicial officers are liable to impeachment by the house of representatives.

The report of the State Treasurer for 1890 shows as follows:

Total actual receipts from all sources during the year 1890.....	\$3,393,513 99	
Transfers into different funds during the year 1890.....	1,251,290 62	
Receipts during the year 1890, including transfers.....		4,644,804 61
Total		\$5,265,806 42
Total actual disbursements during the year 1890.....	\$3,110,031 93	
Transfers from different funds during the year 1890.....	1,251,290 62	
Disbursements during the year 1890, including transfers.....		4,361,322 55
Balance in the treasury at close of business December 31, 1890.....		\$904,483 87

The interest-bearing debt of the State on January 1, 1891, was as follows:

Bonded debt.....	\$8,533,000 00
Six per cent. State School fund certificates of indebtedness.....	2,909,000 00
Five per cent. State School fund certificates of indebtedness.....	209,000 00
Six per cent. State Seminary fund certificates of indebtedness.....	122,000 00
Five per cent. State Seminary fund certificates of indebtedness.....	418,000 00
Total interest-bearing debt.....	\$12,191,000 00

The real estate valuation for 1890 was \$558,522,549, and the total assessed valuation was \$307,551,460.

On April 9, 1682, the French voyager and discoverer La Salle took possession of the country of Louisiana in the name of the king of France. Its limits were quite indefinite, and included the present territory of Missouri (see LOUISIANA). The first settlements of Missouri were made in Ste. Genevieve and at New Bourbon, but uncertainty exists as to the exact date. By some the year is fixed at 1763; by others, and by many traditions, as early as 1735. St. Louis was settled by Pierre Laclède Liguist, a native of France. The site was chosen in 1763, and in February, 1764, Auguste Chouteau went at the order of Liguist to the spot previously selected, and built a small village. For a long time the settlements were confined to the neighborhood of the river. On October 31, 1803, the Congress of the United States passed an act by which the president was authorized to take possession of the territory according to the treaty of Paris, and the formal transfer of Lower Louisiana was made on December 20, 1803. In 1804 Congress divided the territory into two portions. The northern part, commonly called Upper Louisiana, was taken possession of in March, 1804. In June, 1812, Missouri was organized as a Territory, with a governor and general assembly. The first governor (1813-1820) was William Clarke. In 1818 Missouri applied for admission to the Union as a State. Two years of bitter controversy followed, which convulsed the country and threatened the dissolution of the Union. This controversy followed a resolution introduced into Congress which had in view an anti-slavery restriction upon the admission of Missouri to the Union. This was at last settled by the adoption of the "Missouri compromise," which forbade slavery in all that portion of the Louisiana purchase lying north of 36° 30' except in Missouri, and on July 19, 1820, Missouri was admitted to the Union. A convention to frame a constitution had already been called, and the constitution then adopted remained without material change until 1865. The first general assembly under the constitution met in St. Louis in September, 1820, and Alexander McNair was chosen governor in August. The seat of government was fixed at St. Charles in 1820, and removed to Jefferson City, the present State capital, in 1826. The first census of the State was taken in 1821, when the number of inhabitants was found to be 70,647, of whom 11,254 were slaves. In the Black Hawk war in 1832, the Florida war in 1837, and the Mexican war in 1846 Missouri volunteer troops did their share of the work. In the troubles in Kansas, and the bitter discussion upon the question of slavery, Missouri was deeply involved. A strong feeling in favor of secession showed itself in many parts of the State. Governor Jackson, in his inaugural address on January 4, 1861, said that Missouri must stand by the slaveholding States, whatever might be their course. The election of a majority of Union men, however, as delegates to a convention called to consider the affairs of the nation, showed that

public sentiment was hostile to secession, and the convention adjourned without committing the State to the secession party. United States troops were soon gathered at St. Louis, and forces were also sent to Jefferson City, and to Rolla. Governor Jackson fled from the capital, and summoned all the State troops to meet him at Booneville. General Lyon defeated these troops on June 17, 1861, and soon most of the State was under the control of the United States forces. The State convention was reassembled. This body declared vacant the offices of governor, lieutenant-governor, and secretary of state, and filled them by appointment. The seats of the members of the legislature were also declared vacant. Governor Jackson soon issued a proclamation declaring the State out of the Union, and Confederate forces were assembled in large numbers in the southwestern part of the State. General Lyon was killed at the battle of Wilson's Creek near Springfield, and General Fremont, commanding the department of the west, decreed martial law throughout the State. For a year matters were favorable to the confederates, and at the opening of 1862 their troops held nearly half the State; but in February a Federal force under General Curtis drove General Price into Arkansas. He returned in 1864, and overran a large part of the State, but was finally forced to retreat, and but little further trouble arose in Missouri during the war. Missouri furnished to the United States army during the war 108,773 troops. In 1865 a new constitution was adopted by the people. In 1869 the XVth Amendment to the United States constitution was adopted by a large majority. In 1875 still another State constitution was drawn up by a convention called for that purpose, and ratified by the people, and is now the fundamental law of the State.

MISTLETOE (*Viscum album*, L.), a species of *Viscum*, of the family *Loranthaceæ*. The whole genus is parasitical, and seventy-six species have been described; but only the mistletoe proper is a native of Europe. It forms an evergreen bush, about four feet in length, thickly crowded with (falsely) dichotomous branches and opposite leaves. The leaves are about two inches long, obovate-lanceolate, yellowish green; the dioecious flowers, which are small and nearly of the same color but yellow, appear in February and March; the fruit, which when ripe is filled with a viscous semi-transparent pulp (whence birdlime is derived), is almost always white, but there is said to be a variety with red fruit. The mistletoe is parasitic on both deciduous and evergreen trees and shrubs. In England it is most abundant on the apple tree, but rarely found on the oak. The fruit is eaten by most frugivorous birds, and through their agency, particularly that of the thrush (hence missel-thrush or mistle-thrush), the plant is propagated. The sowing is effected by the bird wiping its beak, to which the seeds adhere, against the bark of the tree on which it has alighted. The growth of the plant is slow, and its durability proportionately great, its death being determined generally by that of the tree on which it has established itself. The mistletoe so extensively used in England at Christmas tide is largely derived from the apple orchards of Normandy.

MITAU, a town of Russia, capital of the government of Courland. It is situated twenty-seven miles by rail to the southwest of Riga, on the right bank of the river Aa, in a fertile plain which rises only twelve feet above sea-level. Mitau has 22,200 inhabitants, mainly Germans, but including also Jews (about 6,000), Letts (5,000), and Russians.

MITCHEL, ORMSBY M'KNIGHT, American general and writer on astronomy, was born in Union county, Ky., August 28, 1810. He began life as a clerk, but, obtaining an appointment to a cadetship at West

Point in 1825, he graduated there in 1829, and became assistant professor of mathematics in 1831. From 1859 to 1861 he was director of the Dudley observatory at Albany. He died of yellow fever at Beaufort, S. C., October 30, 1862.

MITCHELL, SIR THOMAS LIVINGSTONE, Australian explorer, was a son of Mitchell of Craigend, Stirlingshire, Scotland, where he was born, June 16, 1792. He died at his residence at Darling Point, Sydney, October 5, 1855.

MITE. Mites (*Acarina*) are minute creatures which form a large division of the *Arachnida*, distinguished by the absence of any constriction between the cephalothorax and abdomen. Linnæus included all in the single genus *Acarus*. They are now divided into several families. Mites are distributed all over the known world. They have been found in Franz-Josef's Land and Spitzbergen and in the hottest tropical regions, as well as the temperate zones. Often very similar species come from all parts. They are numerous in amber of the Tertiary epoch. The best-known species are probably those which injure man or his works, viz., the itch mite, the cheese mite, the so-called harvest-bug, and the red spider. The dog-tick is also well known.

The itch mite (*Sarcoptes scabiei*), is a minute, almost circular, flattened, colorless creature, with skin covered with wavy wrinkles, and a number of triangular points arising from that of the back; legs short, the two front pairs and the fourth pair in the male terminated by suckers on long stalks, the two hind pairs in the female and third pair in the male having long bristles instead. It is parasitic on human beings; the males and young remain chiefly on the surface of the skin, but are difficult to find; the female burrows under the scarf-skin, causing the intense itching of scabies by the action of her chelate mandibles as she eats her way. A small watery pustule is raised near where the acarus has entered the skin, and others arise; the creature is not found in the pustule, but at the further end of a short tunnel which may be half an inch long. The eggs are laid in the tunnel after the acarus has passed; they hatch and multiply rapidly. The disease can be certainly cured; the usual mode is to rub the whole body with sulphur ointment, which is best done after a warm bath, allow it to remain on all night, and wash off in the morning. This treatment should be repeated once or twice at intervals of a day or two. Other applications of sulphur, as sulphurous acid, sulphur vapor baths, etc., are efficacious. All clothes which have touched the skin must be disinfected by heat. The disease is highly contagious. Most mammals have their peculiar varieties of itch mite.

MITFORD, MARY RUSSELL, born at Alresford, Hampshire, England, December 16, 1786, retains an honorable place in English literature as the authoress of *Our Village*, a series of sketches of village scenes and characters unsurpassed in their kind, and, after half a century of imitations, as fresh as if they had been written yesterday. She died January 10, 1855.

MITHRADATES, or, as it is often wrongly spelled, MITHRIDATES (*i.e.*, "given by the god Mithras,") was a favorite name of the Pontic kings in the third and second centuries B.C., and was also common in Persia and the neighboring countries. The most famous of the name was Mithradates Eupator, sixth of the name, one of those remarkable conquerors that arise from time to time in the East. For twenty-four years he withstood the power of Rome, but was finally induced to suicide on account of a revolt of his troops, which left him exposed to the Roman power.

MITHRAS was a Persian god, whose worship spread over the Roman world during the second and third cent-

uries after Christ. His name is found in the oldest records of the East Aryan races.

MITRE. The head dress worn by bishops, abbots, and certain other prelates of the western church when attending solemn church service.

MITSCHERLICH, EILHARDT, was born January 7, 1794, at Neuende, near Jever, in the grand duchy of Oldenburg. In 1818 he went to Berlin, where he worked in the laboratory of Professor Link. He made analyses of phosphates and phosphites, arseniates and arsenites, confirming the observations of Berzelius as to their composition. In the course of these investigations he observed that corresponding phosphates and arseniates crystallized in the same form.

This was the germ from which grew the theory of isomorphism. The theory of isomorphism is the work of Mitscherlich. It was communicated to the Berlin Academy on December 9, 1819.

In pure chemistry Mitscherlich's discoveries were mainly connected with isomorphism. Thus he obtained selenic acid in 1827, and showed the isomorphism of its salts with the sulphates, and examined with great care the manganates and permanganates, showing their isomorphism with the sulphates, and with the perchlorates respectively. But he did much important work unconnected with this special subject.

In 1833 he published his *Lehrbuch der Chemie*, a student's text-book of chemistry of the most thoroughly practical and yet rigidly scientific kind, from the study of which teachers of chemistry may still derive many a valuable hint. In December, 1861, symptoms of heart disease made their appearance, but he was able to carry on his academical work till December, 1862. He died at Schöneberg, near Berlin, on August 28, 1863.

MITYLENE, or MYTILENE. See LESBOS.

MIZPAH (מִצְפָּה) and MIZPEH (מִצְפֶּה) are Hebrew words for a "place of prospect," or high commanding point. The cities of Palestine generally occupied such positions; and so in the Old Testament we find several places bearing the name of "The Mizpah" (Mizpeh). Sometimes a determining genitive is added; "The Mizpeh of Gilead," "The Mizpeh of Moab."

MNEMONICS, or artificial helps to the memory, have been employed in a more or less systematic form from a very early period. Mnemonics were much cultivated by Greek sophists and philosophers, and are repeatedly referred to by Plato and Aristotle. In later times the invention was ascribed to the poet Simonides, perhaps for no other reason than that the strength of his memory was famous. Cicero, who attaches considerable importance to the art, but more to the principle of order as the best help to memory, speaks of Carneades (or perhaps Charmades), of Athens, and Metrodorus of Scepsis as distinguished examples of the use of well-ordered images to aid the memory. The latter is said by Pliny to have carried the art so far that he could repeat anything in the same words he had heard it. The Romans valued such helps as giving facility in public speaking. In his time the art had almost ceased to be practiced. The Greek and Roman system of mnemonics was founded on the use of mental places and signs or pictures. The thing to be remembered was localized in the imagination, and associated with a symbol which concretely represented what it was desired to retain in the memory, special care being taken that the symbols should be as vivid, pleasing, and impressive as possible. The most usual method was to choose a large house, of which the apartments, walls, windows, statues, furniture, etc., were severally associated with certain names, phrases, events, or ideas, by means of symbolic

pictures; and to recall these it was only necessary to search over the apartments of the house, till the particular place was discovered where they had been deposited by the imagination. As the things to be remembered increased, new houses could be built, each set apart to a certain class of ideas or events, and these houses were again constructed into a mnemonic town. In accordance with this system, if it were desired to fix an historic date in the memory, it was localized in an imaginary town divided into a certain number of districts, each with ten houses, each house with ten rooms, and each room with a hundred quadrates or memory-places, partly on the floor, partly on the four walls, partly on the roof. The success of the method depended largely on the power of the imagination to give the different houses, rooms, etc., characteristic varieties of aspect, and we may suppose that it was the effort to frame suitable images and places, giving an adventitious interest to dry details, that constituted the real advantage of the system.

MOA. See DINORNIS.

MOAB. Moab and Ammon (children of Lot) constitute along with Edom and Israel (children of Isaac) that group of four Hebrew peoples which in early antiquity had issued from the Syro-Arabian wilderness, and settled on the border of the cultivated country eastward of the great depression which extends from the Gulf of Elath to the Dead Sea, and up the valley of the Jordan. According to the book of Genesis, they had come out of Mesopotamia, and so were precursors of the larger wave which followed from the same quarter, forming the most southern outpost of the Aramæan immigration into the lands of Canaan and Heth. Whether the Hebrews were originally Aramæans is questionable, but it is certain that, like the Aramæans, they were distinct from the Canaanites, whose conquerors they were.

MO'ALLAKÁT. *Al-Mo'allakát* is the title of a group of seven long Arabic poems, which have come down to us from the time before Islam. The name signifies "the suspended" (pl.), the traditional explanation being that these poems were hung up by the Arabs on or in the Ka'ba at Mecca.

MOBERLY, a thriving town of Randolph county, Mo., twenty-three miles south of Macon, is eligibly situated at the junction of several railroads, and had attained in 1890 a population of 8,215. It has manufactories of carriages, flour, and tobacco, and some large railroad, machine, and car-shops. Moberly has several banks, three newspapers, and twelve churches.

MOBILE, a city and port of entry of the United States, the capital of Mobile county, and, though not the capital, the largest city of Alabama, lies 140 miles east of New Orleans, on a sandy plain on the west bank of Mobile river, one of the arms of the Alabama. The municipal boundary includes an area about six miles long by two or three in breadth; but, excluding the suburban villas scattered about the nearer hills, the portion occupied by the buildings of the city proper is not more than a mile square. In the matter of paving and shade the streets are generally good, and Government street especially, with its fine oak trees and gardens, forms an attractive promenade. Besides the spacious granite building erected in 1859 to accommodate the Custom-house, the Post-office, and the United States courts, the principal edifices are the Roman Catholic cathedral of the Immaculate Conception (1833), Christ Church (Episcopal) (1837), the City Hospital (1830), the United States Marine Hospital (1836), the Providence Infirmary, the conjoint market-house and municipal buildings, Barton Academy (occupied by the high schools), and the Alabama Medical College (founded in 1859). About six

miles out, at Spring Hill, is the Jesuit College of St. Joseph, established by Bishop Portier in 1832. As a commercial center Mobile is in some respects very favorably situated. It is the only port of Alabama; the estuary on which it stands is the outlet for several navigable rivers; and it is the seaward terminus of the Mobile and Ohio railroad, the Mobile and Montgomery, and the Grand Trunk. But, on the other hand, it lies twenty-five miles from the coast; the lagoon-like bay cut off from the Gulf of Mexico by the narrow isthmus of Mobile Point is extremely shallow; and in 1879 no vessel drawing more than thirteen feet could load and unload in the harbor with safety. Since 1827, it is true, various works have been undertaken to improve the approaches: the Choctaw Pass and the Dog River Bar, which had formerly a depth of little more than five and eight feet respectively, were deepened to seventeen feet by 1882. A private company, established in 1876, has built a breakwater in the bay, and greatly increased the safety of the harbor. Though in 1820 it had no more than 2,672 inhabitants, Mobile had 31,255 in 1880, and 31,076 in 1890.

Founded as a fort by Lemoyne d'Iberville (de Bienville) in 1702, Mobile continued to be the capital of the colony of Louisiana till 1723, when this rank was transferred to New Orleans. The site selected by Lemoyne was probably about twenty miles above the present position, which was first occupied after the floods of 1711. By the Treaty of Paris, 1763, Mobile and part of Louisiana were ceded to Britain; but in 1780 the fort (now Fort Charlotte) was captured by the Spanish general Galvez, and in 1783 it was recognized as Spanish along with other British possessions on the Gulf of Mexico. General Wilkinson, ex-governor of Louisiana, recovered the town for Louisiana in 1813, and in 1819, though its population did not exceed 2,500, it was incorporated as a city. In 1864-65 Mobile and the neighborhood was the scene of important military and naval engagements. The Confederates had surrounded the city by three lines of defensive works, but the defeat of their fleet by Admiral Farragut, and the capture of Fort Morgan, Spanish Fort, and Fort Blakely, led to its immediate evacuation. As a municipal corporation Mobile had got into such financial difficulties by 1879 that its city charter was repealed, and a board of commissioners established for the liquidation of its debt of \$2,497,856.

MÖBIUS, AUGUST FERDINAND, astronomer and mathematician, was born at Schulpforta, Germany, November 17, 1790, and died in 1868.

MOCHÁ, a town of Yemen on the coast of the Red Sea. Mochá itself is a modern town, which rose with the coffee trade into short-lived prosperity. The internal disorders of Arabia and the efforts of Mohammed Ali to make the coffee trade again pass through India accelerated its fall, and the place is now a mere village. Mochá never produced coffee, and lies indeed in a quite sterile plain; the European name of Mochá coffee is derived from the shipment of coffee there.

MOCKING-BIRD, or MOCK-BIRD, the *Mimus polyglottus* of modern ornithologists, and the well-known representative of an American group of birds usually placed among the THRUSHES (*q.v.*), *Turdidae*, though often regarded as forming a distinct section of that family, differing by having the tarsus scutellate in front, while the typical thrushes have it covered by a single horny plate. The Mocking-bird inhabits the greater part of the United States, being in the north only a summer visitant; but, though breeding yearly in New England, is not common there, and migrates to the south in winter, passing that season in the Gulf States and Mexico. It appears to be less numerous on the

western side of the Alleghanies, though found in suitable localities across the continent to the Pacific coast, but not farther northward than Wisconsin, and is common in Kansas. The names of the species, both English and scientific, have been bestowed from its capacity of successfully imitating the cry of many other birds, to say nothing of other sounds, in addition to uttering notes of its own which possess a varied range and liquid fullness of tone that are unequaled, according to its admirers, even by those of the NIGHTINGALE, (*q.v.*) Plain in plumage, being grayish-brown above and dull white below, while its quills are dingy black, variegated with white, there is little about the Mocking-bird's appearance beyond its graceful form to recommend it; but the lively gesticulations it exhibits are very attractive, and therein its European rival in melody is far surpassed, for the cock-bird mounts aloft in rapid circling flight, and, alighting on a conspicuous perch, pours forth his ever-changing song to the delight of all listeners; while his actions in attendance on his mate are playfully demonstrative and equally interest the observer. The Mocking-bird is moreover of familiar habits, haunting the neighborhood of houses, and is therefore a general favorite. The nest is placed with little regard to concealment, and is not distinguished by much care in its construction. The eggs, from three to six in number, are of a pale bluish-green, blotched and spotted with light yellowish-brown. They, as well as the young, are much sought after by snakes, but the parents are often successful in repelling these deadly enemies, and are always ready to wage war against any intruder on their precincts, be it man, cat, or hawk. Their food is various, consisting of berries, seeds, and insects.

MODENA, one of the principal cities of Northern Italy, formerly the capital of a duchy, and still the chief town of a province and the seat of an archbishop, is situated in the open country in the south side of the valley of the Po, between the Secchia to the west and the Panaro to the east. By rail it is thirty-one miles east-southeast of Parma, twenty-four west-northwest of Bologna, and thirty-seven south of Mantua.

The university of Modena, originally founded in 1683 by Francis II., is mainly a medical and legal school, but has also a faculty of physical and mathematical science. It has about 25 professors, and from 200 to 250 students; a library of 20,000 volumes, an observatory, botanical gardens, an ethnographical museum, etc. The old academy of the *Dissonanti*, dating from 1684, was restored by Francis in 1814, and now forms the flourishing Royal Academy of Science and Art; and there are besides, in the city, an Italian Society of Science, founded by Anton Mario Lorgna, an academy of fine arts, a military college (1859), an important agricultural college, and a lyceum and gymnasium, both named after Muratori. In industrial enterprise the Modenese show but little activity, silk and linen goods and iron-ware being almost the only products of any note. Commerce is stimulated by a good position in the railway system, and by a canal which opens a water-way by the Panaro and the Po to the Adriatic. The population of the city was 32,248 in 1861, and 30,854 in 1871; that of the commune, 55,512 in 1861, and 58,058 in 1881.

The DUCHY OF MODENA, an independent sovereign state (1452 to 1859), ultimately extended from the Po to the Mediterranean, and was bounded north by Lombardy and the Papal States, east by the Papal States and Tuscany, south by Tuscany, Sardinia, and the Mediterranean, and west by Sardinia and the duchy of Parma. Its greatest length, from Porto-Vecchio, on its northern frontier toward Mantua, to the outlet of the Parmignola torrent, on the Sardinian frontier, was eighty-four and one-half miles; and its greatest width,

from the pass of Calama, on the Papal and Tuscan frontier, to the right bank of the Enza, on the frontier of Parma, was thirty-seven miles. The area was 2,371 square miles, of which three-fifths were mountainous. In 1855 the population was 606,159. The duchy had six provinces—Modena, Reggio, Guastalla, Frignano, Garfagnana, Massa-Carrara.

MODICA, a city of Italy, in the province of Syracuse in Sicily, eight miles from the south coast, on the line of railway decreed in 1879 between Syracuse and Licata. It has increased its communal population from 30,547 in 1861 to 41,231 in 1881, and is a well-built and flourishing place.

MOE, JÖRGEN ENGBRETSSEN, Norwegian poet and comparative mythologist, was born at Hole in Sigdal, Ringerike, Norway, on April 22, 1813, and died in 1882.

MŒSIA (in Greek, Mysia, or, to distinguish it from the country of the same name in Asia, Mysia in Europe), in ancient geography the territory immediately to the south of the Danube corresponding in the main to Servia and Bulgaria. It became a Roman province between 27 B.C. and 6 A.D., probably about 16 B.C.

MOFFAT, a health resort of some note in Scotland, is situated in Upper Annandale, Dumfriesshire, occupying an agreeable position at the base of the Gallow Hill, sixty-three miles from Edinburgh and forty-two miles from Carlisle by railway.

MOFFAT, ROBERT, D.D., African missionary, was born at Ormiston, Haddingtonshire, Scotland, on December 21, 1795, and died in 1883.

MOGADOR, or SUERAH, the most southern seaport town on the Atlantic coast of Morocco, and the capital of the province of Haha. In certain states of wind and sea it is turned almost into an island, and a sea-wall protects the road to Saffi. The population is about 15,000 (7,000 Jews, about 150 foreigners). Jews, Protestants, and Roman Catholics have religious edifices in the town.

MOGHILEFF, a northwestern government or province of the Russian empire, situated on the upper Dnieper, between the provinces of Vitebsk and Smolensk on the north and east, Tchernigoff and Minsk on the south and west.

MOGHILEFF ON THE DNEPER, a town of Russia, capital of the province of same name. It is situated on both banks of the Dnieper, forty miles south of the Orsha station of the railway between Moscow and Warsaw.

MOGHILEFF ON THE DNIESTER, a district town of Russia, situated in the province of Podolia, on the left bank of the Dniester, eighty-seven miles east-southeast of Kamenets-Podolsk, and forty-three miles from the Zhemerinka railway junction. It has 18,200 inhabitants, nearly one-half of whom are Jews; the remainder are Little Russians, Poles (1,500), and a few Armenians.

MOGILAS, PETRUS, a metropolitan of Kieff from 1632, belonged to a noble Wallachian family, and was born about the year 1600. He died in 1647.

MOGUL, or MUGHAL, the Arabic and Persian form of the word Mongol, usually applied to the Mongol empire in India. (See INDIA.)

MOHÁCS, a market town in the Trans-Danubian county of Baranya, Hungary, stands on the right bank of the west arm of the Danube, twenty-five miles east-southeast of Pécs (Fünfkirchen), with which it is connected by railway. The population in 1880 was 12,047 (Magyars, Serbs, and Germans).

MOHAIR is the woolly hair of a variety of the common or domestic goat inhabiting the regions of Asiatic Turkey, of which Angora is the center, whence the animal is known as the Angora goat (see GOAT).

The increasing demand for and value of mohair early stimulated endeavors to acclimatize the Angora goat in other regions; but all European attempts have failed, owing to humid and ungenial climates. In 1849 a flock was taken by Dr. J. P. Davis to the United States of America, and since that time many fresh drafts have been obtained and distributed to Virginia and various Southern States, and to California and Oregon in the west. In these high and dry regions the goats thrive; and the flocks in the Western States now number many thousands. The Angora goat has also been introduced into the Cape of Good Hope with much success.

MOHAMMEDANISM. Under this head is given the history of Mohammed and his successors to the fall of the Eastern Caliphate, with a sketch of the institutions and civilization of the Moslem empire and an account of the Koran. The later history must be sought under the names of individual countries and dynasties. What fails to be said of the social and religious aspects of Islam in modern times will be given under the two great divisions of **SUNNITES** and **SHÍ'ITES**.

MOHAMMED or **MAHOMET** (The Praised), the founder of Islam, first appears in the full light of history with his Flight to Medina (The Hijra), A.D. 622; and this date, not that of his birth, has been fittingly chosen as the epoch of the Moslem Era. The best-attested tradition places his first appearance as a prophet in Mecca some twelve years earlier (*circa* 610). He was then forty years old: the forty must be taken as a round number, but as such is doubtless trustworthy. Thus the birth of Mohammed falls about 570 A.D.: it is said to have fallen in the year when Abrahá, the Abyssinian viceroy of Yemen, made the expedition against Mecca, mentioned in the Koran.

At the time of Mohammed's birth and youth nothing seemed less likely than that the Arabs should presently make their triumphal entrance into the history of the world as victors over the Greeks and Persians. Nowhere in the Peninsula was there an independent state of any considerable power and importance. At the beginning of the sixth century indeed the princes of Kinda had attempted to form a national kingdom, uniting in particular the tribes of central Arabia; but this kingdom was nothing more than an epic prelude to the true history of the Arabs, which begins with Islam. After the fall of the Kindite dynasty, the old anarchy reigned again among the nomads of the Nejd and the Hijáz; in all other quarters Greek or Persian influence predominated, extending from the frontier deep into the interior by the aid of two vassal states—the kingdom of the Ghassanids in the Haurán under Greek suzerainty, and that of the Lakhmids in Híra and Anbár under the Persian empire.

Mohammed's father, 'Abdalláh b. 'Abdalmottalib, did not live to see the son's birth, and his mother Ámina died while he was still a child. Mohammed was then cared for first by his grandfather, 'Abdalmottalib, and after his death by his oldest paternal uncle, Abú Tálib b. 'Abdalmottalib. He was kindly treated, but shared the hardships of a numerous and very poor family; he herded sheep and gathered wild berries in the desert. This is all that we know of his youth. All else is legend, containing at most an occasional fragment of truth.

It was, we are told, in his twenty-fifth year that Mohammed, on the recommendation of his uncle, entered the house and business of a wealthy widow named Khadíja. For her he made commercial journeys, thus learning to know part of Palestine and Syria. By and by he married the widow, who was much his senior; he was a shrewd man, with prepossessing countenance,

fair of skin and black-haired. The marriage was happy, and blessed with several children. The two sons, however, died young; from the elder the father received the surname Abú'l-Kásim. The most famous of the daughters was Fátima, who married her father's cousin, 'Alí b. Abí Tálib.

During his married life with Khadíja, Mohammed came in contact with a religious movement which had laid hold on some thoughtful minds in Medina, Mecca, and Táif. In Mecca, as elsewhere, Arabian heathenism was a traditional form of worship, chiefly concentrated in great feasts at the holy places; it was clung to because it had come down from the fathers. The gods were many; their importance was not due to the attributes ascribed to them, but to their connection with special circles in which they were worshiped. They were the patrons of septs and tribes, and symbolized, so to speak, the holy unity which united the present and past members of these. Above them all stood Alláh, the highest and universal God. By him the holiest oaths were sworn; in his name treaties and covenants were sealed; the lower gods were not fit to be invoked in such cases, as they belonged to one party instead of standing over both. The enemy was reminded of Alláh to deter him from inhuman outrage; enemy of Alláh was the name of opprobrium for a villain. But, since Alláh ruled over all and imposed duties on all, it was not thought that one could enter into special relation with him. In worship he had the last place, those gods being preferred who represented the interest of a specific circle, and fulfilled the private desires of their worshipers. It is very possible that religion meant more to the sedentary Arabs than to the nomads, to whom almost all the ancient poetry belongs; but the difference cannot have been great. The ancient inhabitants of Mecca practiced piety essentially as a trade, just as they do now; their trade depended on the feast, and its fair on the inviolability of the Harem and on the truce of the holy months.

The religion of the Arabs before Mohammed was decrepit and effete. Many anecdotes and verses prove that indifference and scoffing neglect of the gods was nothing uncommon. The need for a substitute for the lost religion was not very widely felt. But there were individuals who were not content with a negation, and sought a better religion. They were called Hanífs, probably meaning "penitents," men who strive to free themselves from sin. They did not constitute a regular sect, and had in fact no fixed and organized views.

Mohammed, it would appear, came into connection with these Hanífs through a cousin of his wife, Waraka b. Naufal, who was one of them.

That Mohammed did not independently produce his own ideas is indisputable; nor is it to be doubted that he derived them from the Hanífs. But what was the ultimate source of these first motions toward Islam? In general they are ascribed to a Jewish source. Jews were very numerous in Hijáz and Yemen, and had perfectly free intercourse with the Arabs, to whom they undoubtedly imparted a quantity of Biblical and religious material. Mohammed in particular was indebted to the Jews for almost all the stories and a great part of the laws of the Koran (laws of marriage, purity, etc.), and the theological language of Islam is full of Jewish words. But the original and productive forces of Islam did not spring from Judaism, least of all the ideas of the Judgment and of the inexorable demands set before the creature by his Creator, which are so dominant in the older súras. A distinction must be drawn between the primitive impulses and the material added later; Mohammed did not get his heaven from the Jews, they only

supplied him afterward with meal. Neither in truth can Christianity be viewed as the proper source of Islam—Christianity, that is, in any of its great historical developments. The deepest influence exercised on the Hanífs, and through them on the Prophet, appears to have come from the anchorite ascetics. It was not their doctrine that proved impressive, but the genuine earnestness of their consecrated life, spent in preparation for the life to come, for the day of judgment, and forming the sharpest contrast to the profanity of heathenism. Asceticism and meditation were the chief points with the Hanífs also, and they are sometimes called by the same name with the Christian monks. It can hardly be wrong to conclude that these nameless witnesses of the Gospel, unmentioned in church history, scattered the seed from which sprang the germ of Islam.

The tradition gives a telling story of the way in which Mohammed at length came to proclaim openly what had long been living and working within him; in other words, how he became a prophet. Once, in the month of Ramadan, while he repeated his pious exercises and meditations on Mount Hirá, the angel Gabriel came to him by night as he slept, held a silken scroll before him and compelled him, though he could not read, to recite what stood written on it. This was the first descent of a passage of the heavenly book, the source of revelation from which Moses and Jesus and all prophets had drawn; and so Mohammed was called to be a prophet. The words with which Gabriel had summoned him to read, remained graven on his heart.

When the angel left him—so the tradition runs on—Mohammed came to Khadíja and recounted the occurrence to her in much distress; he thought that he was possessed. She however comforted him, and confirmed him in the belief that he had received a revelation and was called as a messenger of God. Yet his doubts returned, and there ensued a break in the revelation, and they reached a distressing height. He was often on the point of seeking death by casting himself down from Mount Hirá. It is usually assumed that this state of anguish lasted from two to three years. Then the angel is said to have suddenly appeared a second time; he came to Khadíja in great excitement and said: "Wrap me up! wrap me up!" This, it must be explained, was done when he fell into one of his swoons; and on this occasion, as often thereafter, the revelation came during an attack. Then was sent down súra lxxiv., beginning with the address: "O thou enveloped one!" Henceforth there was no interruption and no doubt; the revelation followed without break, and the Prophet was assured of his vocation.

Mohammed, in the first three years of his mission, did not appear as a public preacher, but only sought recruits for his own cause and the cause of Alláh in private circles. First, he gained the inmates of his own house—his wife Khadíja, his freedman Zaid b. Harítha, his cousin 'Alí, and finally his dearest friend Abúbekr b. Abí Koháfa. The last named won for him several other adherents. Soon there was a little community formed, whose members united in common exercises of prayer.

This indifference of the Meccans embittered Mohammed, and led him to give to his preaching a polemical character which it had not hitherto possessed. It was in his indignation against the cold mockery with which he was met that Mohammed first assumed an attitude of hostility toward polytheism, while at the same time he gave much greater prominence to his own mission, just because it was not acknowledged. He now began to threaten the infidels with the judgment of God for their contempt of His message and His messenger; he related to them the terrible punishments that in other

cases had fallen on those who refused to hear the voice of their prophet, applying the old legends to the circumstances of the present with such directness that it was superfluous expressly to add the morals. This could not fail to irritate the Meccans, especially as after all the new religion gained ground. What Mohammed attacked as ungodly and abominable were their holy things; they were jealous for their gods and their fathers.

The protection of his uncle did not relieve Mohammed from petty insults; but no one ventured to do him serious harm, for the family feud which this would necessarily have produced was not to be lightly incurred. Less fortunate than the Prophet, however, were such of his followers as occupied dependent positions, and had no family support; especially the converted bondmen and bondwomen, who found no consideration, and were often treated with actual cruelty. For some of these Abúbekr purchased freedom. There seem to have been no martyrs, but the situation of many Moslems became so intolerable that they fled to Abyssinia. The Abyssinian Christians were quite looked upon as their religious kinsmen.

A breach with one's people is for the Arab a breach with God and the world; he feels it like a living death. Mohammed, who remained in Mecca, naturally made every effort to heal the breach with his townsmen, and, as naturally, the latter met him half-way. He even went so far as to take the edge from his monotheism, and consequently a reconciliation was effected.

The news of the peace between Mohammed and the Meccans had recalled the fugitive Moslems from Abyssinia; but on their return the actual state of affairs proved very different indeed from what they had been led to expect, and it was not long before a second emigration took place. By degrees as many as a hundred and one Moslems, mostly of the younger men, in little groups, had again migrated to Abyssinia, where they once more met with a friendly reception. Among them were Ja'far, the brother of 'Alí, and the Prophet's daughter, Rokayya, along with her husband 'Othmán b. 'Affán.

Mohammed's position was very considerably altered for the worse, both subjectively and in other respects, by his precipitate withdrawal from the compromise almost as soon as it had been made. He himself indeed, although long and salutarily humbled by the remembrance of his fall, never abandoned faith in his vocation; his followers also did not permit themselves to be led away.

So far as can be gathered, it was at this time that the opposition between Mohammed and his townsmen reached its highest pitch. A personal element, which had lurked from the first in the war of principles, became by degrees increasingly dominant. The idols were less displeasing to Alláh than the idolaters; his own worship was a matter of less concern to him than the recognition of his messenger. With ever-increasing distinctness the prophetic utterances came to be mere words of threatening and rebuke against the Meccans; it was impossible not to recognize in Noah and Moses or Abraham the prophet himself. The coming judgment upon Mecca, and the hour of it, were either in plain words or veiled illusion the continual theme of the "admonisher;" but the oftener and the more urgently it was repeated, the less was the impression it produced. The Meccans did not, on the whole, suffer themselves to be much disturbed by the prospect of the terrible overthrow which was portrayed before them in vivid colors. They were even profane enough to express a desire to see the long-threatened catastrophe arrive at last, and their audacity went so far as to complain of the revelations with which Mohammed sought

to stir their feelings as being tedious. They did not in the least believe that the Biblical narratives, which he related with special pride, were known to him by revelation; on the contrary, they claimed to know perfectly well the human source from which he had derived them. It is very interesting to find Mohammed in presence of their unbelief referring to the recognition and approval with which he met among the children of Israel, and particularly to find him appealing to the testimony of a certain Jew, whom he does not name. Manifestly he had relations with Jews at this period, and was under their influence; and from them, of course, it was that the material of his Old Testament and Haggadic narratives was derived. At the same time it is clear that he himself must have believed these to have come directly to him in a second revelation from above, otherwise he would hardly have taken his stand in the presence of his opponents upon the testimony of the Jews.

The Koraish at last lost all patience. Their heads entered into a solemn compact to break off all intercourse with the Hashimids, as they declined to separate themselves from Mohammed. All buying and selling with the excommunicated persons being forbidden, these found themselves reduced occasionally to outward distress, as well as excluded from all fellowship. This treatment, although apparently never carried out with absolute strictness, did not fail of its effect. The Prophet's more remotely attached adherents fell away from him, and his efforts for the spread of Islam were crippled. All he could do was to encourage those who remained faithful, and to set himself to seek the conversion of his relations.

This state of matters, after continuing for from two to three years, at last became intolerable to the Meccans themselves, who had a variety of relations with the excommunicated family. In the tenth year of the Call (A.D. 619-620) five of the leading citizens paid a visit to the Shi'b Abi Tálib and induced the Banú Háshim and al-Mottalib to come out of their retirement and again appear among their fellow-citizens.

Mohammed was now free once more; but he no longer thought of carrying on his polemic against the Meccans or of seeking to influence them at all. In his relations to them three stadia can be distinguished, although it is easier to determine their character than their chronology. In the first instance, his endeavor was to propitiate them and win them over to his side; when other methods failed, he even went so far as to make complimentary mention of their goddesses in one of his revelations, and thus to set up a compromise with heathenism. When this compromise failed, he forthwith commenced an embittered assault upon the idolaters, which ended in the outlawry of himself and of his family. And now, the ban having been removed, he gave the Meccans up, abandoning them to their hardness of heart. It had become clear to him that in his native town Islam was to make no progress, and that his position was untenable. His feeling of separation was increased all the more with the death of his faithful Khadija about this time, followed soon afterward by that of Abú Tálib, his noble protector. He accordingly came to the determination to take his chance in the neighboring Táif, and set out thither alone. On his arrival he asked the heads of the town whether they would be willing to receive him and protect the free proclamation of his doctrines. He was answered in the negative; the mob drove him out of the town, and pursued him until he found refuge in a vineyard, the property of two noble Meccans. In the present circumstances it was now impossible for him to return into the town, after having openly announced his intention of breaking with it and joining another community.

He did not venture to do so until, after lengthened negotiations, he had assured himself of the protection of a leading citizen, Mot'im b. 'Adi. Notwithstanding all that had happened, he resolved, two months after the death of Khadija, to enter upon a second marriage with Sauda bint Zam'a, a widow of an Abyssinian emigrant.

Chance soon afterward brought to pass what forethought (on his journey to Táif) had failed to accomplish. After having given up the Meccans, Mohammed was wont to seek interviews with the Arabs who came to Mecca, Majanna, Dhú'l-Majáz, and 'Okáz, for the purpose of taking part in the feasts and fairs, and to preach to them. On one such occasion, in the third year before the Flight (A.D. 619-620), he fell in with a small company of citizens of Medina, who to his delight did not ridicule him, as was usually the case, but showed both aptness to understand and willingness to receive his doctrines. Medina was the proper soil for Mohammed's activity. It is singular that he owed such a discovery to accident. He entered into closer relations with the pilgrims who had come thence, and asked them to try to find out whether there was any likelihood of his being received in their town. They promised to do so, and to let him hear from them in the following year.

At the pilgrim feast of next year, accordingly, twelve citizens of Medina had a meeting with Mohammed, and gave him their pledge to have no god but Alláh, to withhold their hands from what was not their own, to flee fornication, not to kill new-born infants, to shun slander, and to obey God's messenger as far as was fairly to be asked. This is the so-called First Homage on the 'Akaba. The twelve men now returned, as propagandists of Islam, to their homes with the injunction to let their master hear of the success of their efforts at the same place on the following year. One of the Meccan Moslems, Mos'ab b. 'Omair, was sent along with or after them, in order to teach the people of Medina to read the Koran, and instruct them in the doctrines and practices of Islam.

Islam spread very quickly on the new soil. It is easy to understand how his joy strengthened the Prophet's spirit to try a higher flight. As a symptom of his exalted frame we might well regard his famous night-journey to Jerusalem, if we could be sure that it belonged to this period. The prophecy also of the final triumph of the Romans over the Persians might very well pass for an expression of his own assurance of victory, as at that time he still had a feeling of solidarity with the Christians. But the prophecy (the only one contained in the Koran) belongs, it would appear, to a much earlier date.

At the Meccan festival of the last year before the Flight (in March, 622), there presented themselves among the pilgrims from Medina seventy-three men and two women who had been converted to Islam. In the night after the day of the sacrifice they again had an interview with the Prophet on the 'Akaba; Al-'Abbás, his uncle, who after Abú Tálib's death had become head of the Banú Háshim, was also present. This is the so-called Second Homage on the 'Akaba, at which Mohammed's emigration to Medina was definitely settled. Al-'Abbás solemnly transferred his nephew from under his own protection to that of the men from Medina, after these had promised a faithful discharge of the duties this involved. They swore to the Prophet to guard him against all they guarded their wives and children from. He, on the other hand, promised thenceforward to consider himself wholly as one of themselves, and to adhere to their society.

The Meccans soon got wind of the affair, notwithstanding the secrecy with which it had been gone about,

but Ibn Obay, the leader of the Medina pilgrim caravan, whom they questioned next morning, was able with good conscience to declare that he knew nothing at all about it, as, being still a heathen, he had not been taken into the confidence of his Moslem comrades, and he had not observed their absence over night. The Meccans did not gain certainty as to what had occurred, until the men of Medina had left. They set out after them, but by this they gained nothing. They next tried, it is said, violently to prevent their own Moslems from migrating. After a considerable pause, they renewed the persecution of the adherents of the Prophet, compelling some to apostasy, and shutting up others in prison. But the measures they adopted were in no case effective, and at best served only to precipitate the crisis. A few days after the homage on the 'Akaba, Mohammed issued to his followers the formal command to emigrate. In the first month of the first year of the Flight (April, 622), the emigration began; within two months some 150 persons had reached Medina. Apart from slaves, only a few were kept behind in Mecca.

Mohammed himself remained to the last in Mecca, in the company of Abúbekr and 'Alí. His reason for doing so is as obscure as the cause of his sudden flight. The explanation offered of the latter is a plan laid by the Meccans for his assassination, in consequence of which he secretly withdrew along with Abúbekr. For two or three days the two friends hid themselves in a cave of Mount Thaur, south from Mecca, till the pursuit should have passed over. They then took the northward road, and arrived safely in Medina on the 12th of Rabí' of the first year of the Flight. Meanwhile 'Alí remained three days longer in Mecca, for the purpose, it is alleged, of restoring to its owners all the property which had been intrusted for safe keeping to the Prophet. The Koraish left him entirely unmolested, and threw no obstacle in his way when, at last, he took his departure.

With the Flight to Medina a new period in the life of the Prophet begins; seldom does so great a revolution occur in the circumstances of any man. Had he remained in Mecca he would, in the best event, have died for his doctrine, and its triumph would not have come until after his death. The Flight brought it about that he, the founder of a new religion, lived also to see its complete victory—that in his case was united all that in Christendom is separated by the enormous interval between Christ and Constantine. He knew how to utilize Islam as the means of founding the Arabian commonwealth; hence the rapidity of its success.

The circumstances in which Mohammed found the city were singularly fitted to change the religious influence which the new prophet brought along with him into another of a political character, and, from being a prophet, to make him the founder of a commonwealth. The Arabs had hitherto been accustomed to lay before their Káhins, or priestly seers, at the sanctuaries, for decision in God's name, all sorts of disputes and hard questions which ordinary means were inadequate to decide. The religious prestige which Mohammed enjoyed led directly to his being frequently called in as adviser and judge. In Medina quarrels and complications were abundant, and an authority to stand over both parties was much needed. Mohammed met this need in the manner which was most acceptable to the Arabs; the authority he exercised did not rest upon force, but upon such a voluntary recognition of the judgment of God as no one had any need to be ashamed of. The expedient of giving one's self out for the messenger of God, and one's speech as the speech of God, is of no avail to one who finds no credence; and credence, such as Mohammed received, is not given for any length of time, to either an imposter or a dupe. Even the respect in

which he was held as a prophet would have helped him little if his decisions had been foolish and perverse. But they were in accordance with truth and sound understanding; he saw into things, and was able to solve their riddle; he was no mere enthusiast, but a thoroughly practical nature as well.

It was not long before he was able to demand as of right that which, in the first instance, had been a voluntary tribute. "Every dispute which ye have one with another ye shall bring before God and Mohammed;" so runs the text in the original constitution for Medina, set up in the first years after the Flight; and in the Koran a rebuke is given to those who continue to seek the administration of justice at the hands of the false gods, *i.e.*, of their priests and seers. With incredible rapidity the Prophet had come to be the most powerful man in all Medina.

Mohammed had thus laid the foundations of his position in a manner precisely similar to that which Moses is said to have followed; and just as the Torah grew out of the decisions of Moses, so did the Sonna out of those of Mohammed. It was perhaps in judicial and regulative activity, which he continued quietly to carry on to the very end of his life, that his vocation chiefly lay. At all events his work in this direction was extremely beneficial, if only because he was the creator of law and justice where previously there had been nothing but violence, self-help, or at least voluntary arrangement.

Mohammed's hostility to the Jews found expression, in the first instance, theoretically more than practically, and especially in the care with which he now differentiated certain important religious usages which he had taken over from Judaism, so that they became distinguishing marks between Islam and Mosaism. Of these alterations the greatest in positive importance is the transference of the Kibla to Mecca. It symbolizes the completion of the Arabizing process which went on step by step with the change which Islam underwent from being an individual to being a political religion. In substituting the Meccan Ka'ba for the sanctuary at Jerusalem, Mohammed did not merely bid farewell to Judaism and assert his independence of it; what he chiefly did was to make a concession to heathenism, and bring about a nationalization of Islam for the purpose of welding together the Arab tribes into one community. Of similar significance was the institution of the feast of sacrifice on the day of the Meccan festival. The Moslems were to observe the latter as much as possible, even if they could not be actually present on the spot.

Thus we have the five chief precepts of Islam—(1) Confession of the unity of God; (2) stated prayer; (3) alms-giving; (4) the fast of Ramadan; (5) observance of the festival of Mecca. Capable of having deeper meanings attached to them, but meritorious also, even in a merely external observance, they were an excellent instrumentality for producing that *esprit de corps*, that obedience to Alláh and his messenger, which constituted the strength of the Moslem system. Up till that time blood-relationship had been the foundation of all political and social relations in Arabia; upon such a foundation it was impossible to raise any enduring edifice, for blood dissociates as much as it unites. But now, religion entered upon the scene as a much more energetic agent in building the social structure; it ruthlessly broke up the old associations, in order to cement the thus disintegrated elements into a new and much more stable system.

The Emigrants (Mohájira) who along with the Prophet had fled from Mecca, were the kernel and the cement of the community. Mohammed seems at first to have cherished the design not only of entirely disowning relationship with the non-Moslems, but also of obliterat-

as much as possible, within Islam, the distinctions of blood, by means of the common faith. He established between emigrants and individual citizens of Medina relationships of brotherhood, which also involved heirship. But he soon abandoned this line, and expressly recognized the validity and sacredness, *within Islam*, of the old rights of family and inheritance. At a subsequent period, he even conceded to relationship and the ties of blood far larger rights than were compatible with Islam, and thus himself laid the foundations of the violent quarrel which rent the community, more particularly in the time of the Omayyads. Similarly it might be said that communism was originally involved in the principles of Islam; but it is characteristic that from the first the alms were less employed for the equalization of society, than for strengthening the hands of the ruling power.

The founding of the state upon the feeling of fellowship generated by religion, was without question the Prophet's greatest achievement; the community of Medina was the tool, its heroic faith the force, by means of which Islam attained the results which figure so largely in the history of the world. Moslem tradition, however, does not stop to inquire what it was that constituted the inward strength of Islam, but goes on at once to relate what were its outward manifestations. Its information on the subject of the period of Mohammed's sojourn in Medina is given under the title of "the campaigns of the apostle of God." With a few of the smaller tribes in the neighborhood of Medina (Johaina, Mozaina, Ghifâr, Aslam), and with the Khozá'a, Mohammed maintained relations of peace and amity; benevolent neutrality gradually grew into alliance, and finally union with the commonwealth of Medina. But toward all the rest of Arabia his very principles placed him in an attitude of war. Ever since Islam from being a religion had become a kingdom, he was compelled to vindicate, by means of war against unbelievers, its claims to supremacy; the conflict of principles had to be settled by the sword, the sole sovereignty of Allâh demonstrated by force to the rebels who showed unwillingness to accept it.

The nearest object against which to direct a holy war was presented by the Meccans. Against them first did Mohammed bring into operation the new principle, that it is faith and not blood that separates and unites.

The first plunder was taken in the month Rajab A.H. 2 (Autumn 623), in which circumstance was at once seen the advantage arising from the change of conscience brought about by the new religion; for in Rajab feuds and plundering raids were held to be unlawful. Relying upon the sacredness of this month a caravan of Koraish was returning from Táif laden with leather, wine, and raisins. But this did not prevent Mohammed from sending out a band of Emigrants to surprise the caravan at Nakhla, between Táif and Mecca; his orders to this effect were given in a document which was not to be unsealed until two days after the departure of the expedition. The plan was carried out, and the surprise was all the more successful, because the robbers gave themselves the outward semblance of pilgrims; one Meccan was killed in the struggle.

The Koraish still remained quiet; another outrage had yet to come. In Ramadan A.H. 2, the return of their great Syrian caravan was expected, and Mohammed resolved to lie in wait for it at Bedr, a favorite watering-place and camping-ground, northward from Medina. For this purpose he set out thither in person along with 308 men; but the leader of the caravan, the Omayyad Abú Sofyán, got word of the plan and sent a messenger to Mecca with a request for speedy help. Concern about their money and goods at last drove the Koraish

to arms; a very short interval found them, 900 strong, on the road to Bedr. By the way they received intelligence that the caravan had made a circuit to the west of Bedr, and was already in safety. Nevertheless they resolved, at the instance of the Makhzumit Abú Jahl, for the sake of their honor, to continue their march. When the Moslems first got touch of them at Bedr, they took them for the caravan; their surprise on discovering the truth may be imagined. But, kept firm by the courage of their leader, they resolved to face the superior numbers of the enemy. On the morning of Friday the 17th of Ramadan, the encounter took place. A number of duels were fought in the front, which were mostly decided in favor of the Moslems. The Meccans at last gave up the fight, strictly speaking for no other cause than that they did not see any reason for carrying it on. They were reluctant to shed the blood of their kinsmen; they were awestruck in presence of the gloomy determination of their adversaries, who did know what they were fighting for, and were absolutely reckless of consequences. After a number of the noblest and oldest of the Koraish, including at last Abú Jahl, had fallen, those who remained took to flight. The number of the dead is said to have been as great as that of the prisoners. Two of the latter, whom he personally hated, Mohammed caused to be put to death.

The battle of Bedr is not only the most celebrated of battles in the memory of Moslems; it was really also of great historical importance. It helped immensely to strengthen Mohammed's position. Thenceforward open opposition to him in Medina was impossible; families which had hitherto withdrawn themselves from his influence were so thoroughly cowed by some atrocious murders carried out in obedience to his orders, that they went over to Islam. He was now in a position to proceed to break up the autonomy of the Jews.

The Meccans also were very deeply impressed by the defeat inflicted on them by the Moslems. They saw clearly that the blow must be avenged, and they took comprehensive measures for their campaign. After a year's delay, their preparations being now complete, and their allies assembled, they set out under the command of Abú Sofyán, and without any check reached Medina, where they pitched their camp to the northeast of the city, in the green corn-fields by Mount Ohod. In Medina the elders were for awaiting the attack on the town and defending themselves within it, but the young men hurried the Prophet into the determination to meet the enemy without the gates; this resolution once come to he persevered in, even after those who had urged him to it had changed their minds. On the morning of Saturday, the 7th of Shawwal, A.H. 3 (January, February, 625), the armies met. At first the battle seemed to be going once more in favor of the Moslems; one after another the standard-bearers and champions of the enemy fell, the whole host wavered, and even the camp was gained. But here their lust for plunder did them an evil turn. Mohammed had covered his left flank against the Meccan horsemen by a number of bowmen, whom he had ordered on no account to leave their post. But as soon as they saw that the enemy's camp was taken, they threw off all discipline, and determined to have their share of what was going. It thus became possible for the Meccan cavalry to fall upon the Moslem rear, and snatch back the victory that had already been won. In the confusion which now ensued Mohammed himself was wounded in the face, and for some time lay for dead on the ground. Among the slain was found his uncle, Hamza b. 'Abdalmottalib, "the lion of God;" his liver was cut out and carried to Abú Sofyán's wife, Hind bint 'Otha, whose father had been killed by Hamza at Bedr. The principal event of A.H. 4 was the

expulsion of the Banú Nadír, the most distinguished and powerful Jewish family in Medina. Summer, 625). Mohammed, under some pretext, suddenly broke with them and ordered their departure within ten days, on pain of death. Relying upon the support of Ibn Obay, they resolved to resist, and sustained a siege within their walls; but the ally they had counted on proved a broken reed, and they were soon compelled to surrender. They were permitted to withdraw, taking with them all their movable property except their arms. With music and roll of drums, the women in gala dress, they marched through the streets of Medina, on their way to Khaibar, where they had property. Their land the Prophet appropriated to himself; the income derived from it could be employed to meet the numerous claims that were made upon him. He seems also to have handed over some of it to the Emigrants, who until then had acquired no property in land in Medina.

Meanwhile, the Banú Nadír were not idle in Khaibar, but left no stone unturned to annihilate their mortal enemy. They succeeded in bringing about an alliance of the Koraish and the great Bedouin tribes of Solaim and Ghatafán, for the suppression of Islam. In the month Dhú 'l-ka'da, A.H. 5 (March, 627), the three armies set out, 10,000 strong, under the command of Abú Sofyán. Mohammed received word of this through the Khozá'a, who secretly played into his hands, and on this occasion he resolved, not as formerly to offer battle on the open field, but to make preparation for a siege. One stormy night the Meccans suddenly raised the siege after it had lasted fourteen days, and returned home. They were followed by the Ghatafán and Solaim. It was with no small joy that the Moslems, on the following morning, discovered the departure of the enemy; it would have been impossible for them to have held out much longer, exhausted as they were, not less by cold and hunger than by the fatigues of constantly mounting guard. As soon as Mohammed had given them permission to leave the camp beside the hill of Sal', they dispersed with the greatest alacrity to their homes.

Mohammed, however, did not allow them much time to recruit. Hardly had they reached their abodes, when he again called them to arms against the treacherous Koraiza. The unlucky Jews had been given over to the sword by the withdrawal of the allies; a siege of fourteen days compelled them to surrender unconditionally. The men were driven in chains to the house of Osáma b. Zaid, whence, on the following morning, Mohammed caused them to be brought, one by one, to the market place of Medina, and there executed. This continued till late in the evening. They were 600 or 700 in number, and among them was the Nadirite Hoyay b. Akhtab, the author of the War of the Fosse, who had left the Meccans to join his fortunes with those of the Koraiza. By accepting Islam these men could have saved their lives, but they preferred death. The women and children were sold into slavery; one young woman only, Banána, suffered the penalty of death for having broken the head of a Moslem with a millstone during the siege. The Prophet selected for himself the fair Raihána, and married her, after having caused her to become a convert to Islam.

The War of the Fosse was the last attack made by the Koraish upon Medina; Mohammed now began to take the offensive toward Mecca. This he at first set about with extreme diplomacy, utilizing the festival, and the truce of God subsisting at the time of the festival, for the purpose of paying a visit to his native town. Although unsuccessful in winning to his side the neighboring tribes of Bedouins, it was nevertheless with a considerable following (1,500 men) that he set out on his journey. In a dream he had had the key of the Ka'ba delivered to

him; on the strength of this his followers believe firmly in the success of the expedition. But the Koraish were determined that the pretext of pilgrimage should not avail their adversary; they summoned their allies and formed a camp to the north of their town for the purpose of preventing the entrance of the Moslems. Mohammed was forced to halt at Hodaibiya on the borders of the sacred territory, and it was in vain that by fair speeches he sought to obtain permission to make the circuit of the Ka'ba. The Koraish judged it best to offer a bargain with Mohammed, the terms being that for this year he was to withdraw, so that the Arabs might not say that he had forced an entrance, but that on the following year he was to return and be permitted to remain three days within the sacred territory for the purpose of sacrifice. The first result of the treaty was that the Khozá'a declared for alliance with Mohammed; while, on the other hand, the Bekr b. Kinána joined themselves to the Koraish.

To compensate his followers for the apparent resultlessness of this expedition, Mohammed immediately after their return led them out against the rich Jews of Khaibar (northward from Medina), whither the Banú Nadír had migrated, and from which place they had unceasingly stirred up opposition against the Prophet. Hitherto he had contented himself with putting out of the way, by means of assassination, some of their leading men who seemed to him to be particularly dangerous, such as Abú Ráfi' and Yosair b. Rázim, but now he resorted to wholesale measures. In May, 628, he made his appearance before Khaibar with a powerful army; in the plunder only those who had taken part in the expedition of Hodaibiya were to share, but many others besides accompanied them. The Jews, although aware of the hostility of Mohammed's intentions, were nevertheless taken completely by surprise when one morning they saw him and his troops encamp before their strongholds.

Citadel after citadel fell into the hands of the Moslems; treachery, which had something to do with the surrender, was well-nigh superfluous. From Al-Natát the Jews were driven to Al-Shikk, and at last nothing was left to them but Al-Katíba (with Al-Watíh and Solálim). There they remained shut up and filled with fear, without even risking, as formerly, single combats and skirmishes before their citadels. After some time they asked for peace, and obtained it on the footing that they retained their lives, wives, and children, and one garment each, but gave up all their property, the penalty of concealing anything being death. Kinána b. b. Abí 'l-Hokaík was cruelly tortured, and at last put to death because he had buried the renowned jewels of his family; thus at the same time his handsome wife Safíya bint Hoyay was left free for Mohammed.

His marriage with "the daughter of the king" wound up the prosperous campaign. Safíya felt no repulsion toward the man who had caused the death of her father Hoyay, and of her husband Kinána; she gracefully accommodated herself to the situation. More worthy was the demeanor of another Jewess, Zainab, who made the attempt to poison the executioner of her people, and atoned for this offense by her death. The attempt was unsuccessful, but Mohammed believed that even in his last illness he could trace the effects of the poison.

The peace of Hodaibiya, with the subsequent conquest of Khaibar, closes the first period of Mohammed's life at Medina; strictly speaking, indeed, it merely confirmed the status which in point of fact the War of the Fosse had already given him.

As a religion Islam did not attract the Arabs; they had no inclination to pray, read the Koran, and give

alms. Of this they had given sufficient evidence by their perennial feuds with Mohammed, and by the murder of divers of his missionaries who were sent to teach them the faith. We can hardly believe that a new spirit now suddenly possessed them. Their change of attitude was merely due to the imposing effect of the rising might of Islam. They began to respect the Moslems, who, in spite of their small numbers, could defy a whole world, because they were of one mind, and did not ask what the world thought. They saw that, in the great conflict between Mecca and Medina, in which as actors or as spectators they had all participated, the victory inclined more and more to the side of Medina, that force could accomplish nothing against faith. There was, moreover, another argument in favor of the new religion, to which the Arabs were very sensible—the rich booty, to wit, which the Moslems acquired by their continual forays. There is no question that the material success of Islam was the chief force that attracted new adherents.

The treaty of Hodaibiya gave a breathing space to the two combatants, and of this the prophet reaped the whole advantage. The truce, which lasted for almost two years, brought to the Meccans an almost unbroken series of humiliations and losses. Next year they looked on with shame and concealed indignation when the Prophet, availing himself of his stipulated right, entered the city with 2,000 men, and performed the sacred ceremonies (March, 629). Still they were afraid to break with him again, and did not even venture to rid themselves of his spies, the Khozá'a, who lived in their midst. They had lost confidence in themselves; they knew that the fight was not fought out, but they dared not seek to bring it to a decision.

Against their will the decision came. The Banú Bekr fell upon Mohammed's friends, the Khozá'a, and were supported by some of their Koraishite allies. The Khozáites complained to the Prophet, who eagerly seized the pretext for war. In vain did the Meccans send Abú Sofyán to Medina to renew the truce; they could not move the Prophet from his purpose. In January, 630, he moved against Mecca with an army of 10,000 men. The Moslems were on the border of the holy land before the Meccans suspected their approach; then suddenly one night 10,000 fires were seen rising to heaven to the northwest of the holy city. The Moslems entered the city from several sides at once, meeting only at one point with an easily quelled resistance. Mohammed insisted that there should be no violence; he pledged the captains to avoid all bloodshed. Ten persons only were put to the ban, and of these one-half were subsequently pardoned. He took all pains to preserve the sanctity of Mecca unimpaired, confirmed the rights and privileges therewith connected, and made it plain that the old cultus should not be less flourishing under Islam. The ceremonies were retained, save only that he abolished all idols, both the domestic gods found in every house and the images in and round the Ka'ba. But every sanctuary outside of Mecca was destroyed, except such as had a part in the celebration of the Feast, and so stood in connection with the Ka'ba itself. Thus the Meccan worship gained a new and unique importance. Mohammed's reform did for Mecca what Josiah's did for Jerusalem.

The last step toward that identification of the Ka'ba with Islam, which made it the religious center of the Moslem world, was not taken till the following year, when the famous Renunciation of sur. ix. forbade the heathen to share in the Feast, which was henceforth to be a strictly Moslem ordinance, and at the same time abrogated the peace of the holy months. A year later (Dhú'l Hijja, A. H. 10, March, 632) he himself celebrated

the Feast for the first time in the orthodox fashion, introducing certain modifications on the traditional practice and reducing certain varieties of use to uniform rule. In all this he professed to reestablish the true ancient use, purged of heretical deviations from the example of Abraham. At the same time he remodeled the Calendar, forbidding the occasional interpolation of a month as an arbitrary and human invention, and establishing the true lunar year of twelve lunations.

The last years of the Prophet were like the ingathering of a harvest laboriously reaped. The conquest of Mecca, so great was the impression it produced, was called "*the* Conquest," as if it contained in itself all others. From every side, in the next two years, the sheikhs streamed to Medina to open negotiations for the acceptance of Islam by their tribes; if they did not come spontaneously, Mohammed sent to them. A change of heart on the part of the Arabs had no more share in these than in former conversions. It cost them no struggle to cast away their idols; the images and the sanctuaries fell quietly enough. Heathenism was a dead thing; superstitions could be transplanted into Islam. The unique sovereignty of Alláh was clearly evidenced in the fact that no might could withstand his. It is safe to affirm that the accessions to Islam were due to political more than religious impulses, and meant adherence to the state of Medina rather than to monotheism. The power to which that city had grown, acted as a force of attraction upon the Arabs; and their subjection was not the mere effect of fear, but expressed also that sense of the necessity for peace and order, which had led to the founding of states in the two previous centuries. Thus it becomes intelligible that from every side, by a sort of natural necessity, the masses of Arabian society were drawn toward the center of attraction at Medina, and that the Prophet received the homage of distant tribes which he could not have influenced directly. The Christian tribes were not behind the rest, they were Arabs first and Christians after. Only the Christians of Najrán remained true to their faith; so did the Jews in all parts, and the Magians in the province of Bahrain. The last named, as idolaters, ought not in strictness to have been tolerated in the Moslem state; but practical considerations broke through theory, and the men of system had to accept the inconsistency with the best grace they could.

The signs of submission were—(1) the performance of the five daily prayers, or at least the proclamation of the times of prayer by the Muedhdhin; (2) the payment of the alms-tax; (3) the acceptance of the Moslem Law, which was introduced by qualified delegates from Medina. Otherwise things remained as they were; Mohammed was careful not to meddle with tribal affairs, and strengthened the existing aristocracies wherever he could do so. The change of faith was effected by treaty; the populace was not consulted, and the whole negotiations were directed by the Elders and Chiefs. For, in fact, purely political interests were involved.

The pilgrimage undertaken by Mohammed in the year 10 (March, 632), was like a very triumph. All Arabia, apart from the vassals of Persia and Greece, lay at his feet. The greatest success of his life had been effected by sheer moral force without a stroke of the sword. But Arabia no longer sufficed him; he had wider aims. In his last years he began to extend the holy war against the Greeks. Even on his return from Hodaibiya, he began to direct envoys to several foreign potentates, with letters demanding their adhesion to Islam. One of these envoys was seized and beheaded in the Belká (the ancient Moab). Hence sprang the first campaign against the Greeks, *i.e.*, the Arabs who were subject to the Greek empire. The army directed

against them was, however, entirely defeated at Mu'ta (Autumn, 629); Khálid succeeded with difficulty in rallying and leading back the broken remnant of the host. Next summer the Nabatæans who visited the market of Medina spread a rumor that the Emperor Heraclius was collecting a vast force to attack the Moslems; and Mohammed set forth to meet him at the head of 30,000 men, but got no farther than Tabúk, on the southern borders of ancient Edom, when the rumor was found to be false. The expedition, however, was not altogether fruitless, as it led to the submission of several small Jewish and Christian communities in the north of the Peninsula. Mohammed equipped a new expedition against the Greeks on his return from his "farewell pilgrimage," and it was just ready to start when he died, on Monday, June 8, 632.

After his death arose the question who was to be his "representative" (Khalífa, Caliph). The choice lay with the community of Medina; so much was understood; but whom were they to choose? The natives of Medina believed themselves to be now once more masters in their own house, and wished to promote one of themselves. But the Emigrants asserted their opposing claims, and with success, having brought into the town a considerable number of outside Moslems, so as to terrorize the men of Medina, who besides were still divided into two parties. The Emigrants' leading spirit was 'Omar; he did not, however, cause homage to be paid to himself but to Abúbekr, the friend and father-in-law of the Prophet.

The affair would not have gone on so smoothly, had not the opportune defection of the Arabians put a stop to the inward schism which threatened. Islam suddenly found itself once more limited to the community of Medina; only Mecca and Táef remained true. The Bedouins were willing enough to pray, indeed, but less willing to pay taxes; their defection, as might have been expected, was a political movement. None the less was it a revolt from Islam, for here the political society and the religious are identical. A peculiar compliment to Mohammed was involved in the fact that the leaders of the rebellion in the various districts did not pose as princes and kings, but as prophets; in this the secret of Islam's success appeared to lie.

Abúbekr proved himself quite equal to the perilous situation. In the first place, he allowed the expedition against the Greeks, already arranged by Mohammed, quietly to set out, limiting himself for the time to the defense of Medina. On the return of the army he proceeded to attack the rebels. The holy spirit of Islam kept the men of Medina together, and inflamed them to a death-defying zeal for the faith; while on the other side, the Arabs as a whole had no other bond of union and no better source of inspiration than universal egoism. As was to be expected, they were worsted; eleven small flying columns of the Moslems, sent out in various directions, sufficed to quell the revolt. Those who submitted were forthwith received back into favor; those who persevered in rebellion were punished with death. The majority accordingly converted, the obstinate were extirpated. In Yamáma only was there a severe struggle; the Banú Hanífa under their prophet Mosailima fought bravely but here also Islam triumphed.

After the subjugation of Middle and North-Eastern Arabia, Khálid b. al-Walíd proceeded by order of the Caliph to the conquest of the districts on the lower Euphrates. Thence he was summoned to Syria, where hostilities had also broken out. Damascus fell late in the summer of 635, and on August 20, 636, the great decisive battle on the Hieromax (Yarmúk) was fought, which caused the emperor Heraclius finally to abandon Syria. In 639 the armies of Syria and 'Irák were face

to face in Mesopotamia. In a short time they had taken from the Aryans all the principal old Semitic lands—Palestine, Syria, Mesopotamia, Assyria, and Babylonia. To these was soon added Egypt, which 'Amr b. al-'Ás, aided by the national and confessional antipathies of the Copts toward the Greeks, overran with little trouble in 641.

It would have been a great advantage for the solidity of the Arabian empire if it had confined itself within the limits of those old Semitic lands, with perhaps the addition of Egypt. But the Persians were not so ready as the Greeks to give up the contest; they did not rest until the Moslems had subjugated the whole of the Sasanid empire. The most important event in the protracted war which led to the conquest of Eran, was the battle of Neháwend in 641; the most obstinate resistance was offered by Persis proper, and especially by the capital, Istakhr (Persepolis). In the end, all the numerous and somewhat autonomous provinces of the Sasanid empire fell, one after the other, into the hands of the Moslems, and the young Shahanshah, Yezdegerd, was compelled to retire to the farthest corner of his realm, where he came to a miserable end. The course of Islam's political history during its first centuries is denoted by the removal of the capital from Damascus to Cufa, and from Cufa to Baghdád, the latter occupying approximately the site of the ancient Ctesiphon.

But we must return to the period of Abúbekr. He died after a short reign, on August 22, 634, and as matter of course was succeeded by 'Omar. To 'Omar's ten years' Caliphate belong for the most part the great conquests. He himself did not take the field, but remained in Medina; he never, however, suffered the reins to slip from his grasp, so powerful was the influence of his personality and the Moslem community of feeling. He died in the beginning of November, 644.

Before his death 'Omar had nominated six of the leading Emigrants who should choose the Caliph from among themselves—'Othmán, 'Alí, Zobair, Talha, Sa'd b. Abí Wakkás, and 'Abd al-Rahmán b. 'Auf. The last named declined to be a candidate, and decided the election in favor of 'Othmán b. 'Affán. Under this weak sovereign the government of Islam fell entirely into the hands of the Koraish nobility. Othmán was killed at the age of eighty.

Controversy now arose among the leaders of the opposition as to the inheritance. The mass of the mutineers summoned 'Alí to the Caliphate, and compelled even Talha and Zobair to do him homage. But soon these two, along with 'Áisha, the mother of the faithful, who had an old grudge against 'Alí, succeeded in making their escape to 'Irák, where at Basra they raised the standard of rebellion. 'Alí in point of fact had no real right to the succession, and moreover was actuated not by piety but by ambition and the desire of power, so that men of penetration, even although they condemned 'Othmán's method of government, yet refused to recognize his successor. The new Caliph, however, found means of disposing of their opposition, and at the battle of the Camel, fought at Basra in November, 656, Talha and Zobair were slain, and 'Áisha was taken prisoner.

But even so 'Alí had not secured peace. With the murder of 'Othmán the dynastic principle gained the twofold advantage of a legitimate cry—that of vengeance for the blood of the gray-haired Caliph, and of a distinguished champion, the Syrian governor Mo'áwiya. Mo'áwiya was not inclined to recognize 'Alí, and the latter did not venture to depose him. To have done so would have been useless, for Mo'áwiya's position in Syria was impregnable. 'Alí was murdered (end of January, 661), thereby posthumously attaining an im-

portance in the eyes of a large part of the Mohammedan world (Shí'a) which he had never possessed during his life. His son Hasan made peace with Mo'áwiya.

'Alí left two sons, Hasan and Hosain. The people of 'Irák chose Hasan Caliph. But he, not having his father's energy, recoiled before the prospect of a war with Mo'áwiya. He abdicated, and only demanded, in exchange for the power which he resigned, pardon for his relatives and a yearly pension of five millions of dirhems (1 dirhem = 2 cents), together with the revenues of the Persian city of Dárábgird. A treaty to this effect was concluded between Mo'áwiya and Hasan, in spite of the opposition of Hosain, who exhorted his brother to continue the struggle; and Mo'áwiya entered Cufa at the head of his army, according to some authorities, toward the end of the month Rabí' I., A.H. 41 (July, A.D. 661), according to others a month or two later. Hasan retired to Medina, where he died eight or nine years afterward, poisoned, it is said, by order of the Caliph.

Mo'áwiya, who now remained sole master of the Moslem empire, was, however, not yet universally acknowledged. Five thousand Khárijites made head against him in the province of Ahwáz, the ancient Susiana, and a revolt broke out at Basra. Ziyád himself, Mo'áwiya's brother, refused to take the oath to him and fortified himself at Istakhr, the ancient Persepolis. After acknowledging Ziyád, who thus became Ziyád son of Abù Sofyán, Mo'áwiya intrusted him with the government of Basra and of Persia, and afterward with that of Cufa, when Moghíra b. Sho'ba died. Ziyád governed 'Irák, with the greatest vigor, to the full satisfaction of Mo'áwiya, who further placed the whole of Arabia under his authority; but in that same year, A.H. 53 (A.D. 672-673), Ziyád died. It seems that Mo'áwiya had thought of him as his successor in the Caliphate. After Ziyád's death the Caliph wished to secure the throne for his own son Yazíd. This was a new violation of the customary rights of Islam; for Mohammed, whose actions served as a rule, had not in his lifetime appointed anyone as his successor.

Yazíd had not his father's genius. Passionately fond of pleasure, and careless about religion, he bestowed more care on turning a pretty couplet than on consolidating the strength of his empire. During his short reign he committed three actions for which Moslems never pardoned his memory; the murder of Hosain, son of 'Alí and grandson of the Prophet; the pillage of Medina; and the taking of the Ka'ba, the venerated temple of Mecca; crimes which were not redeemed in the eyes of the people by a few fortunate expeditions on the part of his generals.

At Mecca the news of the killing of Hosain was received with a degree of indignation of which 'Abdalláh b. Zobair took advantage to assume the title of Caliph. At the news of this revolt, Yazíd first sent an ambassador to Medina. This step proving fruitless, he next collected an army of from ten to twelve thousand Syrians, and intrusted their command to Moslim b. 'Okba, who passed, and with good reason, for a man who would recoil from nothing. This general marched against Medina, took it, after a battle known as the day of Harra, August 26, 683, and gave up the city for three days to massacre and pillage. Torrents of blood flowed, and hence Moslim b. 'Okba received the surname of *Mosrif* (the Prodigal). After a siege of two months, Ibn Zobair was beginning to despair, when he received, through an Arab of the desert, news of the death of Yazíd. The Caliph had in fact died on Rabí' I. 15, (November 11, 683). Hosain b. Nomair immediately offered the Caliphate to Ibn Zobair, on condition that he should grant a complete amnesty to all those who had taken part in the battle of Harra and in the siege

of Mecca. 'Abdalláh had the folly to refuse, and Hosain then returned to Damascus.

Thus rid of his enemy, 'Abdalláh caused the title of Prince of the True Believers to be conferred on him—a title which 'Omar had already received, and which was afterward adopted by all the Caliphs.

It was in the midst of this break up of his party that, immediately after the death of Yazíd, his eldest son, Mo'áwiya II. was elected Caliph at Damascus at the age of only seventeen or twenty. He was a young man of weak character, and imbued, it is said, with Shí'ite opinions. He felt himself incapable of ruling, and was contemplating abdication, when he died, after a reign of but forty days, by poison, as some say; of the plague, as others assert.

Merwán b. al-Hakam had been secretary to the Caliph 'Othmán, and governor of Medina under Mo'áwiya I. Yazíd, on his accession to power, had dismissed him and put Walíd b. 'Otba in his place; but Merwán had continued to live at Medina, and had been driven from it during the revolt of the year 63, and again in the following year, when 'Obaid Alláh b. Zobair had taken possession of that city in the name of his brother.

At the beginning of the year 65 (A.D. 684-685) Merwán returned in haste to Syria; for, during his absence, a brother of Ibn Zobair, named Mos'ab, had invaded that province.

When 'Abd al-Melik ascended the throne, there still remained much to be done before the unity of the empire could be reestablished. Ibn Zobair was still master of Arabia and of 'Irák, though in the latter province his authority was very much shaken by the permanent rebellion of the Shí'ites at Cufa, and of the Khárijites at Basra.

The Omayyad Caliph, whose troops had been beaten in Mesopotamia, and who had been hitherto content to watch the frontiers of Arabia, was again prevented from pushing on military operations more actively by the breaking out of troubles in Syria. Scarcely had he suppressed this revolt, when the Emperor of Constantinople, Justinian II., in violation of the thirty years' truce formerly concluded between Mo'áwiya I. and Constantine IV., sent a Greek army to invade Syria. 'Abd al-Melik was obliged to buy peace for the time, for he required all his forces to dispute the empire with the son of Zobair. He consented, it is asserted to pay the Greeks an indemnity of 1,000 pieces of gold weekly. He then gave his attention to the renewal of the projected expedition against 'Irák.

Only Arabia now remained to Ibn Zobair. In A.H. 72 'Abd al-Melik made preparations for depriving him of it. Accordingly he raised an army; but when his generals found that another siege of Mecca was in contemplation, not one of them was willing to accept such a mission. An obscure officer, Hajjáj b. Yúsuf, boldly offered to lead the expedition. Hajjáj set out, traversed the Hijáz without resistance, and pitched his camp at Táif, not far from Mecca. Ibn Zobair tried to dislodge him; but in the frequent encounters between his troops and those of Hajjáj, the latter always had the advantage. 'Abd al-Melik then decided on sending him a reinforcement of five thousand men, on receiving which Hajjáj invested Mecca. The blockade lasted several months, during which the city was a prey to all the horrors of siege and famine. Hajjáj had set up balistas on the neighboring heights, and poured a hail of stones on the city and the Ka'ba. Famine at length triumphed over the last adherents of the son of Zobair. Ten thousand fighting men, and even several of the sons of the pretender, left the city and surrendered. Mecca being thus left without defenders, Hajjáj took possession of it and invested the Ka'ba. At daybreak

of the 14th of Jomádí I. in the year 73 (October 1, 692), the Omayyad troops made their way into the mosque. 'Abdalláh attacked them furiously, notwithstanding his advanced age, but at last fell, overwhelmed by numbers. His head was cut off, carried to Hajjáj, and sent by the victorious general to Damascus.

With Ibn Zobair perished the influence which the early companions of Mohammed had hitherto exercised over Islam. Medina and Mecca, though they continued to be the Holy Cities, had no longer the political importance which had enabled them to maintain a struggle with Damascus. Temporal interests, represented by Damascus, henceforth had precedence over those of religion; policy outweighed fanaticism; and the center of Islam, now permanently removed beyond the limits of Arabia, was more easily affected by foreign influences, and assimilated more readily their civilizing elements. Damascus, Cufa, and Basra attracted the flower of all the Moslem provinces; and thus that great intellectual, literary, and scientific movement which was to reach its apogee under the 'Abbásid Caliphs at Baghdád, became daily more marked.

By the death of the son of Zobair, 'Abd al-Melik remained sole Caliph; for Mohammed b. Hanafiya reckoned for nothing since the death of Mokhtár, whose creature he had been.

'Abd al-'Azíz having died in the year 84, 'Abd al-Melik chose as heirs of the empire, first his son Walíd, and after him his second son Solaimán. He himself survived 'Abd al-'Azíz only two years, and died 14th Shawwál, 86 (October 8, 705), at the age of about sixty. His reign was one of the most unquiet in the annals of Islam, but also one of the most glorious. 'Abd al-Melik not only brought triumph to the cause of the Omayyads, but extended and strengthened the Moslem power externally. The most important achievement of Walíd's reign was the conquest of Spain. The narrative of this conquest belongs specially to the history of SPAIN, (*q.v.*)

The Byzantine empire was disturbed by internal troubles during the years A.D. 715-717. Solaimán resolved to take advantage of these in order to rid himself forever of the hereditary enemy of Islam, and prepared a formidable expedition. A fleet of eighteen hundred vessels, equipped at Alexandria, sailed to the coasts of Asia Minor, took on board the Moslem army, commanded by Maslama, and transported it to Europe. This army appeared under the walls of Constantinople, August 15, 717, five months after Leo III., the Isaurian, had ascended the throne. Once more the Greek fire prevailed against the Moslems. Their fleet was destroyed by this terrible engine of war; the army could obtain no fresh supply of provisions, and suffered all the horrors of famine. Meanwhile the Caliph, who desired to be present in person at the taking of Constantinople, had set out to join the army. He fell ill at Dábik, not far from Aleppo, and died there on September 22, in the same year, after having nominated as his own successor his cousin, 'Omar b. 'Abd al-'Azíz, and as successor to the latter, Yazíd b. 'Abd al-Melik, his own brother. In vain did the new Caliph dispatch from Egypt a fleet of four hundred ships to carry arms and provisions to the army before Constantinople; this fleet also was destroyed by the Greeks, and the Moslem army was decimated by famine, and soon by the plague as well. A hundred thousand men perished miserably under the walls of Constantinople, and Maslama brought back to Asia Minor a mere handful of soldiers, and that with great difficulty.

'Omar b. 'Abd al-'Azíz, incensed at this disaster, took his revenge on the Christians of his own states by excluding them from all public employments, in spite of

the great services they rendered there, and by loading them with intolerable imposts. By his religious intolerance, by the simplicity of his life, and by his vigor in observing the precepts of his religion and enforcing their observance, 'Omar has acquired in Moslem history the reputation of a saint. But the sanctity of a prince does not insure the greatness of a State; and the reign of 'Omar, as we shall see, was injurious rather than advantageous to Islam.

The 'Abbásid family derived its name from 'Abbás, who was Mohammed's uncle on the father's side, and who, during the prophet's life, had enjoyed universal consideration among the Moslems. It was he who, at the death of the Prophet, had the charge of washing the corpse. The first Caliphs, Abúbekr, 'Omar, 'Othmán, and 'Alí, showed the utmost deference to 'Abbás; and his eldest son 'Abdalláh had been united in the closest friendship with Hosain, the unfortunate son of 'Alí. After the assassination of 'Alí, and the slaughter of Hosain, 'Abdalláh had retired to Mecca, and there brought up his numerous family in hatred of the Omayyads. It was from his youngest son 'Ali, born A.H. 40, that the 'Abbásid dynasty sprung.

From the death of Merwán may be reckoned the real accession of the 'Abbásid dynasty to the Caliphate, which thus returned to the hands of the grand-nephews of the Prophet.

In the year 786 we reach the most celebrated name among the Arabian Caliphs, celebrated not only in the East, but in the West as well, where the stories of the Thousand and One Nights have made us familiar with that world which the narrators have been pleased to represent to us in such brilliant colors.

On the unexpected death of Hádí, the generals and ministers who had declared against Hárún, perceiving that popular favor did not incline to the son of the late Caliph, hastened to rally round the son of Khaizorán; and Aàrún, surnamed Al-Rashíd (The Upright), ascended the throne without opposition. His first act was to choose as prime minister his former tutor, the faithful Yahyá b. Khálid, and to confide important posts to the sons of Yahyá, Fadl and Ja'far, the former of whom was also his own foster-brother. The Barmecide family were endued in the highest degree with those qualities of generosity and liberality which the Arabs prized so highly. Thus the chroniclers are never wearied in their praises of the Barmecides. Loaded with all the burdens of government, Yahyá brought the most distinguished abilities to the exercise of his office. He put the frontiers in a state of defense, and supplied all that was wanting for their security. He filled the public treasury, and carried the splendor of the throne to the highest point.

Although the administration of Hárún states was committed to skillful hands, yet the first years of his long reign were not free from troubles. Hárún in person invaded Asia Minor in the year 181 (A.D. 797-798), and during the following years his generals gained continual victories over the Byzantines, so that Irene was compelled to sue for peace. In the midst of the cares of war, Hárún did not forget his religious duties, and few years passed without his making the pilgrimage. In one of these pilgrimages, A.H. 186 (A.D. 802), he was accompanied by his two eldest sons, Mohammed and 'Abdalláh, and having determined to fix the order of succession in so formal a manner as to take away all pretext for future contentions, he executed a deed by which he appointed Mohammed his immediate heir; after him 'Abdalláh, and after 'Abdalláh a third of his sons, named Kásim. Mohammed received the surname of Al-Amín (The Sure), 'Abdalláh that of Al-Ma'mún (He in whom men trust), and Kásim that of

Mo'tamm billáh (He who trusts in God). Hárún further stipulated that Ma'mún should have as his share, during the lifetime of his brother, the government of the eastern part of the empire. Three years later disturbances broke out in Khorásán, where a certain Ráfi' b. Laith had revolted. Hárún set out for that province, accompanied by his son Ma'mún. It was to be his last journey. He was attacked by a tumor in the abdomen and struggled in vain against this malady, which carried him off a year after his departure, A.H. 193 (A.D. 808-809), just on his arrival at the city of Túš, the birthplace of the great epic poet of Persia, Firdausí. Hárún was only forty-seven years of age. He was succeeded by his son Amin, who was killed in battle.

The reign of Ma'mún, another son of Hárún—that reign on which art, science, and letters, under the patronage of the Caliph, threw so brilliant a luster—had a very stormy beginning. Ma'mún was in no haste to remove to Baghdád, but continued to make Merv his temporary residence.

The duty of the Imám was to recite the public prayer in the mosque. He was appointed by the Caliph or his representatives, and chose in his turn his *Mo'edhdhins*, who called the Faithful to prayer from the tops of the minarets.

The leadership of the yearly pilgrimage to the temple of Mecca was considered a great honor. It was almost always the Caliph himself or one of his near relatives who assumed the function of Amír al-Hajj.

This dynasty was followed by the Fatamite dynasty which reigned for nearly three centuries. From the date of the first crusade Baghdád ceases to have any special history. In 1258 it was taken by the Mongols under Jinghiz Khán and thus expired the Eastern Caliphate, which had lasted 626 years, from the death of Mohammed.

The Koran (Ko'rán) is the foundation of Islam. It is the sacred book of more than a hundred millions of men, some of them nations of immemorial civilization, by all whom it is regarded as the immediate word of God. And since the use of the Koran in public worship, in schools and otherwise, is much more extensive than, for example, the reading of the Bible in most Christian countries, it has been truly described as the most widely-read book in existence. This circumstance alone is sufficient to give it an urgent claim on our attention, whether it suit our taste and fall in with our religious and philosophical views or not. Besides, it is the work of Mohammed, and as such is fitted to afford a clue to the spiritual development of that most successful of all prophets and religious personalities. It must be owned that the first perusal leaves on a European an impression of chaotic confusion—not that the book is so very extensive, for it is not quite so large as the New Testament. This impression can in some degree be modified only by the application of a critical analysis with the assistance of Arabian tradition.

To the faith of the Moslems, as has been said, the Koran is the word of God, and such also is the claim which the book itself advances.

The rationale of revelation is explained in the Koran itself as follows: In heaven is the original text ("the mother of the book;" "a concealed book;" "a well-guarded tablet"). By a process of "sending down," one piece after another was communicated to the Prophet. The mediator was an angel, who is called sometimes the "Spirit," sometimes the "holy Spirit," and at a later time "Gabriel." This angel dictates the revelation to the Prophet, who repeats it after him, and afterward proclaims it to the world. It is plain that we have here a somewhat crude attempt of the Prophet to represent to himself the more or less unconscious process by

which his ideas arose and gradually took shape in his mind. It is no wonder if in such confused imagery the details are not always self-consistent.

It is an explicit statement of the Koran that the sacred book was revealed ("sent down") by God, not all at once, but piecemeal and gradually. This is evident from the actual composition of the book, and is confirmed by Moslem tradition. That is to say, Mohammed issued his revelations in fly-leaves of greater or less extent. A single piece of this kind was called either, like the entire collection, *ko'rán*, *i. e.* "recitation" or "reading;" or *kitáb*, "writing;" or *súra*, which is the late-Hebrew *shūrā*, and means literally "series." The last became, in the lifetime of Mohammed, the regular designation of the individual sections as distinguished from the whole collection; and accordingly it is the name given to the separate chapters of the existing Koran. These chapters are of very unequal length. Since many of the shorter ones are undoubtedly complete in themselves, it is natural to assume that the longer, which are sometimes very comprehensive, have arisen from the amalgamation of various originally distinct revelations. This supposition is favored by the numerous traditions which give us the circumstances under which this or that short piece, now incorporated in a larger section, was revealed; and also by the fact that the connection of thought in the present súras often seems to be interrupted. And in reality many pieces of the long súras have to be severed out as originally independent; even in the short ones parts are often found which cannot have been there at first.

How these revelations actually arose in Mohammed's mind is a question which it is almost as idle to discuss as it would be to analyze the workings of the mind of a poet. In his early career, sometimes perhaps in its later stages also, many revelations must have burst from him in uncontrollable excitement, so that he could not possibly regard them otherwise than as divine inspirations. We must bear in mind that he was no cold systematic thinker, but an Oriental visionary, brought up in crass superstition, and without intellectual discipline; a man whose nervous temperament had been powerfully worked on by ascetic austerities, and who was all the more irritated by the opposition he encountered, because he had little of the heroic in his nature. Filled with his religious ideas and visions, he might well fancy he heard the angel bidding him recite what was said to him.

How the various pieces of the Koran took literary form is uncertain. Mohammed himself, so far as we can discover, never wrote down anything. The question whether he could read and write has been much debated among Moslems, unfortunately more with dogmatic arguments and spurious traditions than authentic proofs. At present, one is inclined to say that he was not altogether ignorant of these arts, but that from want of practice he found it convenient to employ some one else whenever he had anything to write. After the flight to Medina (A.D. 622) we are told that short pieces—chiefly legal decisions—were taken down immediately after they were revealed, by an adherent whom he summoned for the purpose; so that nothing stood in the way of their publication. Hence it is probable that in Mecca, where the art of writing was commoner than in Medina, he had already begun to have his oracles committed to writing. That even long portions of the Koran existed in written form from an early date may be pretty safely inferred from various indications; especially from the fact that in Mecca the Prophet had caused insertions to be made, and pieces to be erased in his previous revelations.

MOHL, JULES, Orientalist, was born at Stuttgart in 1800, and died in 1876.

MÖHLER, JOHANN ADAM, Roman Catholic theologian, was born at the village of Igersheim in Württemberg on May 6, 1796, and died in 1836.

MOHR, KARL FRIEDRICH, a philosopher whose greatest claims to scientific distinction are as yet, though indubitable, only partially admitted, was the son of a well-to-do druggist in Coblenz, and was born November 4, 1806. Although he stood at the very head of the scientific pharmacists of Germany, his name was deliberately omitted from the list of the commission entrusted with the preparation of the *Pharmacopœia Germanica*. Yet in that work many of his ideas and processes were incorporated by the very men who had previously denounced them. He died in October, 1879.

MOIR, DAVID MACBETH, the "Delta" of *Blackwood's Magazine*, one of its most popular contributors in its early days, was born at Musselburgh, January 5, 1798, and was a physician in active practice there from his manhood to his death (July 6, 1851).

MOIR, GEORGE, author of the treatises on "Poetry," and "Romance" in the seventh edition of the *Encyclopædia Britannica*, and born at Aberdeen in 1800, was an Edinburgh lawyer of very varied accomplishments. He died in 1870.

MOISSAC, chief town of an arrondissement in the department of Tarn-et-Garonne, France, is situated on the right bank of the Tarn, and on the railway line from Bordeaux to Cette, seventeen miles west-northwest of Montauban.

MOKADDASÍ. Shams al-Dín Abú Abdalláh Mohammed ibn Ahmad al-Mokaddasí, *i.e.*, of Jerusalem, also called al-Bashsharí, was the author of a famous description of the land of Islam, which much surpasses the earlier works of the same kind. His first pilgrimage was made at the age of twenty, but his book was not published till A.H. 375 (985-6 A.D.), when he was forty years old.

MOKANNA. See MOHAMMEDANISM.

MOKSHAN, a town of Russia, situated in the government of Penza, twenty-seven miles to the northwest of the capital of the province, and eighteen miles from the Ranzay railway station. It has 14,500 inhabitants, who are engaged in agriculture, or work in flour-mills, oil-works, tanneries, and potash-works.

MOLA, or MOLA DI BARI, a seaport town of Italy, in the province of Bari, thirteen miles from Bari on the railway to Brindisi. Population, 12,435 in 1889.

MOLASSES. See SUGAR.

MOLAY JACQUES DE, a native of Burgundy, became grand-master of the order of the Temple in 1298, and was the last who held that dignity. He was burned at the stake in 1314. (See TEMPLARS.)

MOLDAVIA. See ROUMANIA.

MOLE (contracted form of mold-warp, *i.e.*, mold-caster), a term restricted in England to the common mole (*Talpa europæa*), a small, soft-furred, burrowing mammal, with minute eyes, and broad fossorial fore feet, belonging to the order *Insectivora* and family *Talpida*, but generally applied elsewhere to any underground burrowing animal of the class *Mammalia*.

Talpa europæa, the Common Mole, type of the genus *Talpa*, is about six inches in length, of which the tail measures somewhat more than an inch; the body is long and cylindrical, and, owing to the very anterior position of the forelimbs, the head appears to rest between the shoulders; the muzzle is long and obtusely pointed, terminated by the nostrils, which are close together in front; the minute eye is almost hidden by the fur; the ear is without a conch, opening on a level with the surrounding integument; the forelimbs are rather short and very muscular, terminating in broad, naked, shovel-shaped feet, the palms normally directed out-

ward, each with five subequal digits armed with strong flattened claws; the hind-feet, on the contrary, are long and narrow, and the toes are provided with slender claws. The body is densely covered with soft, erect, velvety fur—the hairs uniform in length and thickness, except on the muzzle and short tail, the former having some straight vibrissæ on its sides, while the latter is clothed with longer and coarser hairs. The fur is generally black, with a more or less grayish tinge, or brownish-black, but various paler shades up to pure white have been observed.

The food of the mole consists chiefly of the common earth-worm, in pursuit of which it forms its well-known underground excavations.

The sexes come together about the second week in March, and the young—generally from four to six in number—which are brought forth in about six weeks, quickly attain their full size.

MOLECULE. In the conception of the atomic as opposed to the continuous and infinitely divisible constitution of matter, it is supposed that portions of matter called *atoms* exist, which are separated, or are capable of being separated, from each other by empty space. (See ATOM). It may be the case that each atom has unchangeable shape and volume as well as unchangeable mass, but such a conception of an atom is not essential to the hypothesis. It is not even necessary to maintain that no part of space can be in two atoms at the same time. But one attribute of the atom upon which its permanence, or, so to speak, its personal identity, depends, is its constituent mass, and this remains the same, unchanged and unchangeable, through all time.

Boscovich, indeed, goes so far as to regard the atom as a mere center of force, the result of whose existence is that no two atoms or centers can approach each other within a certain distance, while other physicists regard the atomic volume as a distinct portion of space occupied by that atom to the exclusion of every other, and comprising within it matter ideally infinitely divisible, but the parts of which in fact never can be separated from each other. In this latter mode of viewing the subject, all the conclusions of mechanics which are based on the conception of the continuity and infinite divisibility of matter may be applied to the equilibrium or motion of each individual atom, the atomic theory merely introducing the additional hypothesis that, in fact, these persistent entities called atoms do exist, and that out of them all substances which affect our senses are constructed. The theory of universal gravitation requires us to believe in the existence of force or actions between every portion of matter and every other portion, determinate in magnitude and direction, and such that, when on the infinitely divisible hypothesis the volumes of these portions are indefinitely diminished, these mutual forces are inversely proportional to the square of the distance between the portions (the distance between any two points, one in the volume of each portion, being in this case taken as the distance between the portions), and directly proportional to the products of the masses, or quantities of the two portions of matter—such forces being regarded provisionally as ultimate facts, while inviting further analysis and explanation. Chemical and chemico-physical investigations indicate the existence of other actions between portions of matter, following other and for the most part unknown laws, and rapidly becoming inappreciable as the distance between the reacting portions is increased. All these hypotheses are to be retained on the hypothesis of discrete atoms as above enunciated, the mutual actions between atoms being the resultant of the actions between the various portions of

their constituent matter. The volumes of the atoms are so small that, for any sensible distances apart, the line of the resultant mutual action between them may be taken as coincident with the line joining any point in the volume of one to any point in the volume of the other, but, for distances or parts comparable with the linear dimensions of the atoms, the size and shape of their bounding surfaces must be taken into consideration, and perhaps also the law of distribution of their constituent matter within that surface. In all respects, unless we accept the Boscovichian hypothesis, we simply regard the atom as made up, so to speak, of infinitely divisible matter, while substances, as we know them, are built up of indestructible and unchangeable atoms.

With this conception of an atom, as thus explained, we might be content to rest, confessing our total ignorance of the mode in which such atoms are built up into actual substances, being satisfied to regard such substances as composed of these distinct portions of matter separated, or capable of being separated, by empty space from other portions. But the *molecular* hypothesis of the constitution of different kinds of substances aims at analyzing this process by which such substances are built up out of their constituent atoms. The *molecule* of any substance is, by some chemists, defined as being the smallest portion of that substance to which can be attributed all the chemical properties of the substance; by others, as the smallest portion which, so long as the substance is chemically unchanged, keeps together without complete separation of its parts. In the language of Clausius' theorem, if the parts of the molecule have internal motion, the kinetic energy of such internal motion is equal to the virial of the mutual attractive forces of the parts. Thus the formation of the molecule of each particular substance is viewed as an essential step in the process of building up that substance out of its constituent atoms. The molecule is first built up out of atoms arranged in its formation according to a definite type, and then the substance itself is constituted of these molecules. Of course molecules may be, and in fact in many particular substances are, supposed to be monatomic; that is to say, the intermediate step of building up the molecule out of the atoms has, in these particular substances, been omitted, the atoms and molecules becoming then identical. The particular arrangement of the formed molecules in the building up of the substance determines the physical state of that substance—that is, its fluid, solid, gaseous, crystalline, or amorphous state; but the chemical properties of the substance depend upon the constitution of the molecule. As the investigations and theories of chemistry appear to indicate irresistibly the existence of permanent atoms, so do they also lead almost as necessarily to the conception of the molecule as an entity which bears the same relation to special substances that the atoms bear to matter generally. So long as the molecule endures, the substance of which it is the molecule retains its chemical properties; with the dissolution of the molecule, the substance, as that special substance, perishes; the atoms alone continue, and are free to enter into other combinations. The permanence of the molecule is relative, that of the atom absolute. This conception of the molecular constitution of substances suggests physical questions of great interest, such as the shape, volume, and mass of the constituent molecules, and the relative motions of which their parts are susceptible; and the answers to these questions cannot fail to be of great value in chemical and chemico-physical investigations, as well as in the theories of light and electricity.

Now, whatever differences may exist between the

properties of different substances in the solid and liquid states, there are certain properties which, in the gaseous state, manifest themselves with no variation whatever in all substances alike. Hence the explanation of these common properties—or gaseous laws, as they are called—has long possessed a peculiar fascination for physicists. The tendency to expand or fill all accessible space, manifested by all gases, proves that on the molecular hypothesis their compound atoms or molecules must be continually tending to fly apart. We must conceive gases as constituted of molecules, not only separable but actually separated by space void of the matter of which these gases consist; and it may be most reasonably expected, therefore, that any general laws to which substances in this state conform may afford us a valuable insight into the constitution of these separate molecules.

Now the general laws to which all gases conform are: (1) *Boyle's law*—that, in a given mass of any gas kept at constant temperature, the pressure per unit of area upon the containing surface increases in the same proportion as the volume occupied by the gas is diminished, or at least with very slight deviation from exact proportionality; (2) *Charles' law*—that if the temperature be varied while the pressure upon the gas remains the same, the gas increases by $\frac{1}{273}$ of its volume at zero centigrade for every degree of centigrade added to the temperature, or, which in common with Boyle's law is the same thing, that if the density be constant, the pressure is directly proportional to the temperature measured from the point -273° centigrade, this point being called the zero of absolute temperature; (3) *Avogadro's law*—which asserts that all gases at the same temperature and pressure contain the same number of molecules in the same volume; and (4) *Dalton's law*—that in a mixture of different gases, when there is equilibrium, each gas behaves as a vacuum to all the rest.

It was at one time considered that these phenomena might be explained on the hypothesis of mutual repulsive forces between the parts of which the gas is composed, whether they were regarded as constituted of molecules or of infinitely divisible continuous matter, but it has been shown in the article ATOM that there are at least two absolutely conclusive reasons why this explanation cannot be accepted. These objections, together with the experimental fact proved by Joule that gases, or at any rate atmospheric air, expand into vacuum with scarcely any appreciable change of temperature, must be considered fatal to any mutual-force theory of gaseous action, and accordingly, physicists have been driven to seek for other methods of explaining these laws. The explanation which has been more developed than any other is that known as the kinetic theory of gases, which regards the intrinsic energy of a gaseous mass as residing, not in the potential energy of intermolecular forces, but mainly in the kinetic energy of the molecules themselves, which are assumed to be in a state of continual relative velocity, admitting at the same time a possible small intermolecular potential energy, and it may be also an interatomic energy between the atoms of the individual molecules. That some such persistent relative motion does exist in every gaseous mass is evident from the rapidity with which odors penetrate the stillest air where no breath of wind—that is, of absolute motion of translation of the mass as a whole or any portion of finite size—is perceptible. It becomes an interesting question whether the laws of mechanics admit of a mass thus constituted ever arriving at a state of permanence; that is to say, whether consistently with the hypothesis of infinite irregularities in the directions and magnitudes of velocities of individual molecules, there may be found any properties of the

mass in the aggregate which remain constant, and in agreement with the accepted laws common to all gases. Now the physical theory of heat compels us to regard the intrinsic energy of any gaseous mass as dependent entirely or almost entirely upon the temperature. If, therefore, this intrinsic energy is to be sought for in the kinetic energy of the moving molecules, it follows that the average value of the kinetic energy of the molecules taken throughout the mass must be also a function of the temperature.

Many attempts have been made in recent years to form an estimate or conjecture, more or less accurate, of the numerical value of the dimensions of a molecule and the absolute force between molecules.

It is first necessary to define what is meant by the dimensions of a molecule. Regarded as an elastic sphere, it has dimensions with the conception of which we are familiar. It is not, of course, seriously contended by any physicists that the molecules of a gas are actually hard elastic spheres, exerting no force on each other at any distance greater than that of actual contact, and then an infinite force. It is necessary to conceive the forces as finite, although they may diminish so rapidly with the distance as that the motions of molecules in the aggregate differ little from what they would be if the molecules were ideal elastic spheres. Nevertheless, they must be finite forces; and that being the case, it is difficult, if not impossible, to frame a definition of the boundary of a molecule, except as a certain surface at which the forces acting between the molecule in question and other molecules attain a certain value.

The word *Molecule* is used by chemists to express the unit of a pure substance, that quantity of it which its formula ought to represent. What this quantity is in any particular case, must be ascertained by studying the chemical actions by which the substance is produced and the chemical changes which it undergoes.

The formula usually assigned to acetic acid is $C_2H_4O_2$. This agrees with almost all the chemical actions in which it takes part. Thus, one quarter of the hydrogen is replaceable by other metals, as in $C_2H_3KO_2$, etc.; and one, two, or three quarters of the hydrogen can be replaced by chlorine. There must, therefore, be two (or a multiple of four) atoms of hydrogen in the molecule. Similarly, half of the oxygen can be replaced by sulphur, and one-half of the oxygen along with one-quarter of the hydrogen can be replaced by chlorine. There must, therefore, be two (or a multiple of two) atoms of oxygen in the molecule. Again, the formation of marsh gas and carbonate of soda, when acetate of soda is heated with caustic soda, and the formation of aceto-nitrile from cyanide of potassium and iodide of methyl, show that the carbon in acetic acid is divisible by two, or that the molecule contains two (or a multiple of two) atoms of carbon. $C_2H_4O_2$ is the simplest formula which fulfills these conditions, but the existence of an acid acetate of potash and an acid acetate of ammonia, the formulæ of which are usually written $C_2H_3KO_2$, $C_2H_4O_2$ and $C_2H_3(NH_4)O_2$, $C_2H_4O_2$, as if these were compounds derived from two molecules of acetic acid, might lead us to $C_4H_8O_4$, as this shows that the hydrogen is divisible by eight. In the same way we can easily satisfy ourselves that $C_6H_{10}O_5$, or some multiple of it, is the formula of starch, that C_8H_5NO , or some multiple of it, is the formula of indigo blue, and so on.

MOLESKIN is a stout heavy cotton fabric of leathery consistence woven as a satin twill on a strong warp. It is finished generally either as a bleached white or as a slaty drab color, but occasionally it is printed in imitation of tweed patterns. Being an exceedingly durable and economical texture, it was formerly much more worn by workingmen, especially outdoor laborers,

than is now the case. It is also used for gun-cases, carriage-covers, and several purposes in which a fabric capable of resisting rough usage is desirable.

MOLESWORTH, SIR WILLIAM, the eighth baronet, was born in London, May 23, 1810, and succeeded to the extensive family estates in Devon and Cornwall in 1823. From 1837 to 1841 Sir William Molesworth sat for the borough of Leeds, and during those years acquired considerable influence in the House of Commons by his speeches and by his tact in presiding over the select committee on Transportation. From 1841 to 1845 he remained in private life, occupying his leisure time in editing the works in Latin and English of Thomas Hobbes of Malmesbury, a recreation which cost him no less than \$30,000. In the latter year he was returned for the borough of Southwark, and retained that seat until his death. In July, 1855, he was called to preside over the Colonial Office, but unfortunately its duties were no sooner intrusted to his care than he was cut off by death (October 22, 1855).

MOLFETTA, a city and seaport of Italy, in the province of Bari, sixteen miles by rail north-northwest of Bari. From the sea it presents a fine appearance with its white stone houses and the remains of its turreted walls; and there are several buildings of considerable pretensions. The population is 27,000.

MOLIÈRE, to give Jean Baptiste Poquelin the stage name which he chose, for some undiscovered reason, to assume, was born in Paris, probably in January, 1622. He was entered at the College of Clermont, where, among more serious studies, the Jesuit fathers encouraged their pupils to take part in *ballets*, and in later life Molière was a distinguished master of this sort of entertainment. According to Grimarest, the first writer who published a life of Molière in any detail (1705), he not only acquired "his humanities," but finished his "philosophy" in five years. He left the Collège de Clermont in 1641, the year when Gassendi, a great contemner of Aristotle, arrived in Paris. His college education over, Molière studied law, and there is even evidence—that of tradition in Grimarest, and of Le Boulanger de Chalus-say, the libelous author of a play called *Élomire Hypochondre*—to prove that he was actually called to the bar. More trustworthy is the passing remark in La Grange's short biography (1682), "*au sortir des écoles de droit, il choisit la profession de comédien.*" Before joining a troop of half-amateur comedians, however, Molière had some experience in his father's business. In 1637 his father had obtained for him the right to succeed to his own office as "valet tapissier de chambre du roi." When the king traveled the valet tapissier accompanied him to arrange the furniture of the royal quarters. There is very good reason to believe that Molière accompanied Louis XIII. as his valet tapissier to Province in 1642. It is even not impossible that Molière was the young valet de chambre who concealed Cinq Mars just before his arrest at Narbonne, June 13, 1642. But this is part of the romance rather than of the history of Molière. Our next glimpse of the comedian we get in a document of January 6, 1643. Molière acknowledges the receipt of money due to him from his deceased mother's estate, and gives up his claim to succeed his father as "valet de chambre du roi." On December 28th of the same year we learn, again from documentary evidence, that Jean Baptiste Poquelin, with Joseph Bédard, Madeleine Bédard, Geneviève Bédard, and others, have hired a tennis-court, and fitted it up as a stage for dramatic performances. The company called themselves *L'illustre Théâtre, illustre* being then almost a slang word, very freely employed by the writers of the period.

Molière's connection with the family of Bédard brought him much unhappiness. The father of this family,

Joseph Bédard the elder, was a needy man with eleven children at least. His wife's name was Marie Hervé. The most noted of his children, companions of Molière, were Joseph, Madeleine, Geneviève, and Armande. Of these, Madeleine was a woman of great talent as an actress, and Molière's friend, or perhaps mistress, through all the years of his wanderings. Now, on February 14, 1662 (for we must here leave the chronological order of events), Molière married Armande Claire Élisabeth Grésinde Bédard. His enemies at that time, and a number of his biographers in our own day, have attempted to prove that Armande Bédard was not the sister, but the daughter of Madeleine, and even that Molière's wife may have been his own daughter by Madeleine Bédard. All the arguments in support of this abominable theory are based on reckless and ignorant confusions, and do not deserve criticism.

To return to the order of events, Molière passed the year 1643 in playing with, and helping to manage, the Théâtre Illustre. The company acted in various tennis-courts, with very little success. Molière was actually arrested by the tradesman who supplied candles, and the company had to borrow money from one Aubrey to release their leader from the Grand Châtelet (August 13, 1645). The process of turning a tennis-court into a theater was somewhat expensive, even though no seats were provided in the pit. The troop was for a short time under the protection of the duc d'Orléans, but his favors were not lucrative. The duc de Guise, according to some verses printed in 1646, made Molière a present of his cast-off wardrobe. But costume was not enough to draw the public to the tennis-court theater of the Croix Noire, and empty houses at last obliged the Théâtre Illustre to leave Paris at the end of 1646.

Molière now determined to play among the rural towns. The career of a strolling player is much the same at all times and in all countries. Perrault tells us what the arrangements of the theater were in Molière's early time. Tapestries were hung round the stage, and entrances and exits were made by struggling through the heavy curtains, which often knocked off the hat of the comedian, or gave a strange cock to the helmet of a warrior or a god. The lights were candles stuck in tin sconces at the back and sides, but luxury sometimes went so far that a chandelier of four candles was suspended from the roof. At intervals the candles were let down by a rope and pulley, and any one within easy reach snuffed them with his fingers. A flute and tambour, or two fiddlers, supplied the music. The highest prices were paid for seats in the *dedans* (cost of admission 10 cents); for the privilege of standing up in the pit 5 cents was the charge. The doors were opened at one o'clock, the curtain rose at two.

The nominal director of the Théâtre Illustre in the provinces was Du Fresne; the most noted actors were Molière, the Bédards, and Du Parc, called Gros René. It is extremely difficult to follow exactly the line of march of the company. They played at Bordeaux, for example, but the date of this performance, when Molière (according to Montesquieu) failed in tragedy and was pelted, is variously given as 1644-45 (Trallage), 1647 (Loiseleur), 1648-58 (Lacroix). We find Molière at Nantes in 1648, at Fontenay-le-Compte, and in the spring of 1649 at Agen, Toulouse, and probably at Angoulême and Limoges. In January, 1650, they played at Narbonne, and between 1650 and 1653 Lyons was the headquarters of the troupe. In January, 1653, or perhaps 1655, Molière gave *L'Etourdi* at Lyons, the first of his finished pieces as contrasted with the slight farces with which he generally diverted a country audience. At Lyons De Brie and his wife, the famous Mlle. de Brie, entered the troupe, and Du Parc married Mar-

quise de Gorla, better known as Mlle. du Parc. Molière's own opinion of the ladies and men of his company may be read between the lines of his *Impromptu de Versailles*. In 1653 Prince de Conti, after many political adventures, was residing at La Grange, near Pézénas, in Languedoc, and chance brought him into relations with his old schoolfellow Molière. Conti had for first gentleman of his bedchamber the abbé Daniel de Cosnac, whose memoirs now throw light for a moment on the fortunes of the wandering troupe. Cosnac engaged the company "of Molière and of La Béjart;" but another company, that of Cormier, nearly intercepted the favor of the prince. Thanks to the resolution of Cosnac, Molière was given one chance of appearing on the private theater of La Grange. The excellence of his acting, the splendor of the costumes, and the insistence of Cosnac, and of Sarrasin, Conti's secretary, gained the day for Molière, and a pension was assigned to his company. As Cosnac proposed to pay Molière a thousand crowns of his own money to recompense him in case he was supplanted by Cormier, it is obvious that his profession had become sufficiently lucrative. In 1654, during the session of the estates of Languedoc, Molière and his company played at Montpellier. Here Molière danced in a *ballet* (*Le Ballet des Incompatibles*) in which a number of men of rank took part, according to the fashion of the time. Molière's own rôles were those of the Poet and the Fishwife. The sport of the little piece is to introduce opposite characters, dancing and singing together. Silence dances with six women, Truth with four courtiers, Money with a poet, and so forth. Whether the ballet or any part of it is by Molière is still disputed.

In April, 1655, it is certain that the troupe was at Lyons, where they met and hospitably entertained a profligate buffoon, Charles d'Assoucy, who informs the ages that Molière kept open house, and "*une table bien garnie*." November, 1655, found Molière at Pézénas, where the estates of Languedoc were convened, and where local tradition points out the barber's chair in which the poet used to sit and study character. The longest of Molière's extant autographs is a receipt, dated at Pézénas, February 4, 1656, for 6,000 livres, granted by the estates of Languedoc. This year was notable for the earliest representation, at Béziers, of Molière's second finished comedy, the *Dépôt Amoureux*. Conti now withdrew to Paris, and began to "make his soul," as the Irish say. Almost his first act of penitence was to discard Molière's troupe (1657), which consequently found that the liberality of the estates of Languedoc was dried up forever. Conti's relations with Molière must have definitely closed long before 1666, when the now pious prince wrote a treatise against the stage, and especially charged his old schoolfellow with keeping a new school, a school of atheism. Molière was now (1657) independent of princes and their favor. He went on a new circuit to Nismes, Orange, and Avignon, where he met another old classmate, Chapelle, and also encountered the friend of his later life, the painter Mignard. After a later stay at Lyons, ending with a piece given for the benefit of the poor on February 27, 1658, Molière passed to Grenoble, returned to Lyons, and is next found in Rouen, where, we should have said, the Théâtre Illustre had played in 1643. At Rouen Molière must have made or renewed the acquaintance of Pierre and Thomas Corneille. His company had played pieces by Corneille at Lyons and elsewhere. The real business of the comedian in Rouen was to prepare his return to Paris. After several secret journeys thither he was fortunate enough to secure the patronage of Monsieur, the king's only brother, who granted him his protection,

and permitted the company to take his name, presenting them as his servants to the king and the queen-mother. The troupe appeared for the first time before Louis XIV. in a theater arranged in the old Louvre (October 24, 1658).

Molière was now thirty-six years of age. He had gained all the experience that fifteen years of practice could give. He had seen men and cities, and noted all the humors of rural and civic France. He was at the head of a company which, as La Grange, his friend and comrade, says, "sincerely loved him." He had the unlucrative patronage of a great prince to back him, and the jealousy of all play-wrights, and of the old theaters of the Hôtel de Bourgogne and the Marais, to contend against.

The first appearance of Molière before the king was all but a failure. *Nicomède*, by the elder Corneille, was the piece, and we may believe that the actors of the Hôtel de Bourgogne, who were present, found much to criticise. When the play was over, Molière came forward and asked the king's permission to act "one of the little pieces with which he had been used to regale the provinces." The *Docteur Amoureux*, one of several slight comedies admitting of much "gag," was then performed, and "diverted as much as it surprised the audience." The king commanded that the troupe should establish itself in Paris. The theater assigned to the company was a *salle* in the Petit Bourbon, in a line with the present Rue du Louvre. The first piece played in the new house (November 3, 1658), was *L'Étourdi*. La Grange says the comedy had a great success, producing seventy pistoles for each actor.

The next piece, new in Paris, though not in the provinces, was the *Dépit Amoureux* (first acted at Béziers, 1656). The play was not less successful than *L'Étourdi*. "Nothing so good," says Mr. Saintsbury, "had yet been seen on the French stage, as the quarrels and reconciliations of the quartette of master, mistress, valet, and soubrette." The same praise was given, perhaps even more deservedly, to *Les Précieuses Ridicules* (November 18, 1659). Doubts have been raised as to whether this famous piece, the first true comic satire of contemporary foibles on the French stage, was a new play. La Grange calls it *pièce nouvelle* in his *Registre*, but, as he enters it as the third *pièce nouvelle*, he may only mean that, like *L'Étourdi*, it was new to Paris. The success of the *Précieuses Ridicules* was immense; on one famous occasion the king was a spectator, leaning against the great chair of the dying Cardinal Mazarin. The play can never cease to please while literary affectation exists, and it has a comic force of deathless energy. Yet a modern reader may spare some sympathy for the poor heroines, who do not wish, in courtship, to "begin with marriage," but prefer first to have some less formidable acquaintance with their wooers. Molière's next piece was less important, and more purely farcical, *Sganarelle; ou le Cocu Imaginaire* (May 28, 1660).

On October 11, 1660, the Théâtre du Petit Bourbon was demolished by the superintendent of works, without notice given to the company. The king gave Molière the Salle du Palais Royal, but the machinery of the old theater was maliciously destroyed. Meanwhile the older companies of the Marais and the Hôtel de Bourgogne attempted to lure away Molière's troupe, but, as La Grange declares, "all the actors loved their chief, who united to extraordinary genius an honorable character and charming manner, which compelled them all to protest that they would never leave him, but always share his fortunes." While the new theater was being put in order, the company played in the houses of the great, and before the king at the Louvre. In

their new house (originally built by Richelieu) Molière began to play on January 20, 1661. Molière now gratified his rivals by a failure. *Don Garcie de Navarre*, a heavy tragi-comedy, which had long lain among his papers, was first represented on February 4, 1661. Either Molière was a poor actor outside comedy, or his manner was not sufficiently "stagy," and, as he says, "demoniac," for the taste of the day. His opponents were determined that he could not act in tragi-comedy, and he, in turn, burlesqued their pretension and exaggerated manner in a later piece.

The subject of this unsuccessful drama is one of many examples which show how Molière's mind was engaged with the serious or comic aspects of jealousy, a passion which he had soon cause to know most intimately. Meantime the everyday life of the stage went on, and the doorkeeper of the Théâtre St. Germain was wounded by some revelers who tried to force their way into the house. A year later, an Italian actor was stabbed in front of Molière's house, where he had sought to take shelter. To these dangers actors were peculiarly subject. Molière himself was frequently threatened by the marquises and others whose class he ridiculed on the stage, and there seems even reason to believe that there is some truth in the story of the angry marquis who rubbed the poet's head against his buttons, thereby cutting his face severely. Before Easter, Molière asked for two shares in the profits of his company, one for himself, and one for his wife, if he married. That fatal step was already contemplated. On June 24th he brought out for the first time *L'École des Maris*. It is significant of Molière's talent that the grotesque and baffled paternal wooer, "Sganarelle," like several other butts in Molière's comedy, does to a certain extent win our sympathy and pity as well as our laughter. The next new piece was *Les Fâcheux*, a *comédie-ballet*, the Comedy of Bores, played before the king at Fouquet's house at Vaux le Vicomte (August 15-20, 1661). In the dedication to the king Molière says that Louis suggested one scene (that of the Sportsmen), and in another place he mentions that the piece was written, rehearsed, and played in a fortnight. The fundamental idea of the play, the interruptions by bores, is suggested by a satire of Régnier's, and that by a satire of Horace.

In February, 1662, Molière married Armande Béjard. The hideous accusation brought by the actor Montfleury, that Molière had married his own daughter, Louis XIV. answered by becoming the godfather of Molière's child. The king, indeed, was a firm friend of the actor; and, when Molière was accused of impiety on the production of *Don Juan* (1665), Louis gave him a pension. We need not try to make Madame Molière a *vertu*, as French ladies of the theater say, but it is certain that the charges against her are unsubstantiated.

From 1662 onward Molière suffered the increasing hatred of his rival actors. On December 26th was played for the first time the admirable *École des Femmes*, which provoked a literary war, and caused a shower of "paper bullets of the brain." The innocence of Agnes was called indecency; the sermon of Arnolphe was a deliberate attack on Christian mysteries. We have not the space to discuss the religious ideas of Molière; but both in *L'École des Femmes* and in *Don Juan* he does display a bold contempt for the creed of "boiling chaldrons" and of a physical hell.

Molière's next piece was *Le Mariage Forcé* (February 15, 1664), a farce with a ballet. The comic character of the reluctant bridegroom excites contemptuous pity, as well as laughter. From the end of April till May 22d the troupe was at Versailles, acting among the picturesque pleasures of that great festival of the king's. The *Princesse d'Élide* was acted for the first time, and

the first three acts of *Tartuffe* were given. Molière's natural hatred of hypocrisy had not been diminished by the charges of blasphemy which were showered on him after the *École des Femmes*. *Tartuffe* made enemies everywhere. Jansenists and Jesuits, like the two marquises in *L'Impromptu de Versailles*, each thought the others were aimed at. Five years passed before Molière got permission to play the whole piece in public. In the interval it was acted before Madame, Condé, the legate, and was frequently read by Molière in private houses. The *Gazette* of May 17, 1664 (a paper hostile to Molière), says that the king thought the piece inimical to religion. Louis was not at that time on good terms with the *dévots*, whom his amours scandalized; but, not impossibly, the queen-mother (then suffering from her fatal malady) disliked the play. A most violent attack on Molière, "that demon clad in human flesh," was written by one Pierre Roullé (*Le Roy Glorieux au Monde*, Paris, 1664). This fierce pamphlet was suppressed, but the king's own copy, in red morocco with the royal arms, remains to testify to the bigotry of the author, who was curé of Saint Barthélemy. According to Roullé, Molière deserved to be sent through earthly to eternal fires. The play was prohibited, as we have seen, but in August, 1665, the king adopted Molière's troupe as his servants, and gave them the title of "troupe du roy." This, however, did not cause Molière to relax his efforts to obtain permission for *Tartuffe*, and his perseverance was at length successful. That his thoughts were busy with contemporary hypocrisy is proved by certain scenes in one of his greatest pieces, the *Festin de Pierre*, or *Don Juan* (February 15, 1665). The legend of *Don Juan* was familiar already on the Spanish, Italian, and French stages. Molière made it a new thing: terrible and romantic in its portrait of *un grand seigneur mauvais homme*, modern in its suggested substitution of *la humanité* for religion, comic, even among his comedies, by the mirthful character of "Sganarelle." The piece filled the theater, but was stopped, probably by authority, after Easter. It was not printed by Molière, and even in 1682 the publication of the full text was not permitted. Happily the copy of De la Regnie, the chief of the police, escaped obliterations, and gave us the full scene of "Don Juan" and the "Beggar." The piece provoked a virulent criticism (*Observations sur le Festin de Pierre*, 1665). It is allowed that Molière has some farcical talent, and is not unskilled as a plagiarist, but he "attacks the interests of Heaven," "keeps a school of infidelity," "insults the king," "corrupts virtue," "offends the queen-mother," and so forth. Two replies were published, one of which is by some critics believed to show traces of the hand of Molière. The king's reply, as has been shown, was to adopt Molière's company as his servants, and to pension them. *L'Amour Médecin*, a light comedy, appeared September 22, 1665. In this piece Molière, for the second time, attacked physicians. In December there was a quarrel with Racine about his play of *Alexandre*, which he treacherously transferred to the Hôtel de Bourgogne. June 4, 1666, saw the first representation of that famous play, *Le Misanthrope* (ou *L'Atrabilaire Amoureux*, as the original second title ran). This piece, perhaps the masterpiece of Molière, was more successful with the critics, with the court, and with posterity than with the public.

A briefer summary must be given of the remaining years of the life of Molière. The attractions of *Le Misanthrope* were reinforced (August 6th) by those of the *Médecin Malgré Lui*, an amusing farce founded on an old *fabliau*. In December the court and the comedians went to Saint Germain, where, among other di-

versions, the pieces called *Mélicerte*, *La Pastorale Comique* (of which Molière is said to have destroyed the MS.), and the charming little piece *Le Sicilien*, were performed. A cold and fatigue seem to have injured the health of Molière, and we now hear of the consumptive tendency which was cruelly ridiculed in *Élomire Hypochondre*. Molière was doubtless obliged to see too much of the distracted or pedantic physicians of an age when medicine was the battlefield of tradition, superstition, and nascent chemical science. On April 17, 1667, Robinet, the rhyming gazetteer, says that the life of Molière was thought to be in danger. On June 10th, however, he played in *Le Sicilien* before the town. In the earlier months of 1667 Louis XIV. was with the army in Flanders. There were embassies sent from the comedy to the camp, and, on August 5th, it was apparent that Molière had overcome the royal scruples. *Tartuffe* was played, but Lamoignon stopped it after the first night. La Grange and La Torillière hastened to the camp, and got the king's promise that he would reconsider the matter on his return. Molière's next piece (January 13, 1668) was *Amphitryon*, a free—a very free—adaptation from Plautus, who then seems to have engaged his attention, for not long afterward he again borrowed from the ancient writer in *L'Avare*. There is a controversy as to whether *Amphitryon* was meant to ridicule M. de Montespan, the husband of the new mistress of Louis XIV. Michelet has a kind of romance based on this probably groundless hypothesis. The king still saw the piece occasionally, after he had purged himself and forsworn sack under Madame de Maintenon, and probably neither he nor that devout lady detected any personal references in the coarse and witty comedy. As usual, Molière was accused of plagiarizing, this time from Rotrou, who had also imitated Plautus. The next play was the immortal *George Dandin* (July 10th), first played at a festival at Versailles. Probably the piece was a rapid palimpsest on the ground of one of his old farces, but the addition of these typical members of a county family, the De Sotenville, raises the work from farce to satiric comedy. The story is borrowed from Boccaccio, but is of unknown age, and always new—"Adolphus Crosbie," in *The Small House at Allington*, being a kind of modern "George Dandin." Though the sad fortunes of this peasant with social ambition do not fail to make us pity him somewhat, it is being too refined to regard *George Dandin* as a comedy with a concealed tragic intention. Molière must have been at work on *L'Avare* before *George Dandin* appeared, for the new comedy after Plautus was first acted on September 9th. There is a tradition that the piece almost failed; but, if unpopular in the first year of its production, it certainly gained favor before the death of its author. *M. de Pourceaugnac* (September 17, 1669,) was first acted at Chambord for the amusement of the king. It is a rattling farce. The physicians, as usual, bore the brunt of Molière's railery, some of which is still applicable.

Earlier in 1669 (February 5th) *Tartuffe* was played at last, with extraordinary success. *Les Amants Magiques*, a comedy-ballet, was acted first at Saint Germain (February 10, 1670). The king might have been expected to dance in the ballet, but from Racine's *Britannicus* (December 13, 1669) the majestic monarch learned that Nero was blamed for exhibitions of this kind, and he did not wish to out-Nero Nero. Astrology this time took the place of medicine as a butt, but the satire has become obsolete, except, perhaps, in Turkey, where astrology is still a power. The *Bourgeois Gentilhomme*, too familiar to require analysis, was first played on October 23, 1770. The lively *Fourberies de Scapin* "saw the footlights" on May 24,

1671, and on May 7th we read in La Grange, "les Repetitions de Spsyche ont commencé." La Grange says the theater was newly decorated and fitted with machines. The *Comtesse d'Escarbagnas* (February 2, 1672) was another piece for the amusement of the court, and made part of an entertainment called *Le Ballet des Ballets*. In this play, a study of provincial manners, Molière attacked the financiers of the time in the person of M. Harpin. The comedy has little importance compared with *Les Femmes Savantes* (February 11th), a severer *Précieuses*, in which are satirized the vanity and affectation of sciolists, pedants, and the women who admire them. Molière died on February 17, 1673, seven days after the first presentation of the *Malade Imaginaire*.

MOLINA, LUIS, a Spanish Jesuit, whom Pascal's *Lettres d'un Provincial* have rendered immortal, was born at Cuenca in 1535. He was called, at the end of twenty years, to the chair of moral theology in Madrid, where he died on October 12, 1600.

MOLINE, a city of Rock Island county, Ill., is situated in a picturesque district on the left bank of the Mississippi, opposite the upper end of Rock Island. First settled in 1832, the town was organized as a city in 1872. It is noted for its water-power, developed and maintained by the government, and for the number and importance of its manufacturing establishments. By means of a dam nearly a mile in length, from the Illinois shore to the island, an almost uniform head of seven feet of water is obtained, which is used in driving the machinery of the government arsenal on the island, and in supplying power to several factories. Beds of bituminous coal are mined in the neighborhood, and three lines of railway pass through the city, affording with the river ample means of communication. The most prominent manufactures are agricultural implements and machinery generally; wagons, organs, paper, and stoves. Moline has nine churches, a complete system of graded free schools, including a high school, and a free library. The population increased from 4,066 in 1870 to 7,805 in 1880, and with the suburbs the number is now (190) returned at 12,000.

MOLINOS, MIGUEL DE, a Spanish priest whose name is intimately associated with that type of religion known in Italy and Spain during the latter half of the seventeenth century as Quietism, was born in the diocese of Saragossa about 1627 and died in 1696.

MOLISE, now CAMPOBASSO, a province of Italy, stretching twenty miles along the coast of the Adriatic, and bounded by the Abruzzi (Chieti and Aquila), Terra di Lavoro (Caserta), Benevento, and Capitanata (Foggia). About five-sixths of the surface may be described as mountainous or hilly, the loftiest range being the Matese on the border toward Benevento, with its highest point in Monte Miletto, 6,750 feet. The population, which increased from 346,007 in 1861 to 365,434 in 1881, is mainly dependent on pastoral and agricultural pursuits, neither manufactures nor trade being highly developed. According to the census of 1871, there were six places with more than 5,000 inhabitants—Campobasso, 12,890; Riccia, 8,123; Isernia, 7,715; Agnone, 7,147; Cascalende, 6,217; and Larino, 5,357; according to the census of 1881, 21 of the 133 communes had a population not exceeding 4,000.

MOLLUSCA. The Mollusca form one of the great "phyla," or subkingdoms of the Animal Pedigree or Kingdom. The shell-bearing forms belonging to this group which were known to Linnæus were placed by him (in 1748) in the third order of his class Vermes, under the name "Testacea," while the Echinoderms, Hydroids, and Annelids, with the naked Molluscs,

formed his second order termed "Zoöphyta." Ten years later he replaced the name "Zoöphyta" by "Mollusca," which was thus in the first instance applied, not to the Mollusca at present so termed, but to a group consisting chiefly of other organisms. Gradually, however, the term Mollusca became used to include those Mollusca formerly placed among the "Testacea," as well as the naked Mollusca.

It is important to observe that the Greek term, *μαλάκια*, of which Mollusca is merely a Latinized form, was used by Aristotle to indicate a group consisting of the Cuttle-fishes only.

The definite erection of the Mollusca into the position of one of the great primary groups of the animal kingdom is due to George Cuvier (1788-1800), who largely occupied himself with the dissection of representatives of this type. An independent anatomical investigation of the Mollusca had been carried on by the Neapolitan Naturalist Poli (1791), whose researches were not published until after his death (1817) and were followed by the works of another Neapolitan zoölogist, the illustrious Delle Chiaje.

The "embranchement" or sub-kingdom Mollusca, as defined by Cuvier, included the following classes of shell-fish: 1, the cuttles or poulps, under the name CEPHALOPODA; 2, the snails, whelks, and slugs, both terrestrial and marine, under the name GASTROPODA; 3, the sea-butterflies or winged snails, under the name PTEROPODA; 4, the clams, mussels, and oysters, under the name ACEPHALA; 5, the lamp-shells, under the name BRACHIOPODA; 6, the sea-squirts or ascidians, under the name NUDA; and 7, the barnacles and sea-acorns, under the name CIRRHOPODA.

The main limitations of the sub-kingdom or phylum Mollusca, as laid down by Cuvier, and the chief divisions thus recognized within its limits by him, hold good to the present day. At the same time, three of the classes considered by him as Mollusca have been one by one removed from that association in consequence of improved knowledge, and one additional class, incorporated since his day with the Mollusca with general approval, has, after more than forty years, been again detached and assigned an independent position, owing to newly-acquired knowledge.

The first of Cuvier's classes to be removed from the Mollusca was that of Cirrhopoda. Their affinities with the lower Crustacea was recognized by Cuvier and his contemporaries, but it was one of the brilliant discoveries of J. Vaughan Thompson, which decided their position as Crustacea. The metamorphoses of the Cirrhopoda were described and figured by him in 1830 in a very complete manner, and the legitimate conclusion as to their affinities was formulated by him. The next class to be removed from Cuvier's Mollusca was that of the Nuda, better known as Tunicata. In 1866 the Russian embryologist, Kowalewsky, startled the zoölogical world with a minute account of the developmental changes of Ascidia, one of the Tunicata, and it became evident that the affinities of that class were the Vertebrata, while their structural agreements with Mollusca were only superficial. The last class which has been removed from the Cuvierian Mollusca is that of the Lamp-shells, or Brachiopoda. The history of its dissociation is connected with that of the class, viz., the Polyzoa or Bryozoa, which has been both added to and again removed from the Mollusca between Cuvier's date and the present day. The name of J. Vaughan Thompson is again that which is primarily connected with the history of a Molluscan class. In 1830 he pointed out that among the numerous kinds of "polyps" at that time associated by naturalists with the Hydroids, there were many which had a peculiar and more

elaborate type of organization, and for these he proposed the name of Polyzoa. Subsequently they were termed Bryozoa by Ehrenberg (1831).

Henri Milne-Edwards in 1844 demonstrated the affinities of the Polyzoa with the Molluscan class Brachiopoda, and proposed to associate the three classes Brachiopoda, Polyzoa, and Tunicata in a large group "Molluscoidea," coördinate with the remaining classes of Cuvier's Mollusca, which formed a group retaining the name Mollusca. By subsequent writers the Polyzoa have in some cases been kept apart from the Mollusca and classed with the "Vermes;" while by others they have, together with the Brachiopoda, been regarded as true Mollusca. The recent investigation by Mr. Caldwell (1882) of the developmental history of Phoronis, together with other increase of knowledge, has now, however, established the conclusion that the agreement of structure supposed to obtain between Polyzoa and true Mollusca is delusive; and accordingly they, together with Brachiopoda, have to be removed from the Molluscan phylum. Further details in regard to this, the last revolution in Molluscan classification, will be found in the article POLYZOA.

As thus finally purified by successive advances of embryological research, the Mollusca are reduced to the Cuvierian classes of Cephalopoda, Pteropoda, Gastropoda, and Acephala. Certain modifications in the disposition of these classes are naturally enough rendered necessary by the vast accumulation of knowledge as to the anatomy and embryology of the forms comprised in them during fifty years. Foremost among those who have within that period labored in this group are the French zoölogists Henri Milne-Edwards and Lacaze Duthiers, to the latter of whom we owe the most accurate dissections and beautiful illustrations of a number of different types. To Kölliker, Gegenbaur, and more recently Spengel, among German anatomists, we are indebted for epoch-making researches of the same kind. In England, Owen's anatomy of the pearly nautilus, Huxley's discussion of the general morphology of the Mollusca, and Lankester's embryological investigations, have aided in advancing our knowledge of the group.

The classes of the Mollusca which we recognize are as follows:—

Phylum MOLLUSCA.

BRANCH A. Glossophora.	BRANCH B. Lipocephala. (=Acephala, Cuvier).
Class 1. GASTROPODA. <i>Br. a.—Isopleura.</i> <i>Examples—Chiton, Neomenia.</i> <i>Br. b.—Anisopleura.</i> <i>Examples—Limpet, Whelk, Snail, Slug.</i>	Class 1. LAMELLIBRANCHIA. (Syn. Conchifera). <i>Examples—Oyster, Mussel, Clam, Cockle.</i>
Class 2. SCAPHOPODA. <i>Example—Tooth-shell.</i>	
Class 3. CEPHALOPODA. <i>Br. a.—Pteropoda.</i> <i>Examples—Hyalæa, Pseudomon.</i> <i>Br. b.—Siphonopoda.</i> <i>Examples—Nautilus, Cuttles, Poulp.</i>	

The forms comprised in the above groups, while exhibiting an extreme range of variety in shape, as may be seen on comparing an oyster, a cuttle-fish, and a sea-slug such as *doris*: while adapted. some to life on dry

land, others to the depths of the sea, others to rushing streams; while capable, some of swimming, others of burrowing, crawling, or jumping, some, on the other hand, fixed and immobile; some among the most formidable of carnivores, others feeding on vegetable mud, or on the minutest of microscopic organisms—yet all agree in possessing in common a very considerable number of structural details which are not possessed in common by any other animals.

The structural features which the Mollusca possess in common with other animals belonging to other great phyla of the animal kingdom are those characteristic of the Coelomata, one of the two great grades (the other and lower being that of the Coelentera) into which the higher animals, or Enterozoa as distinguished from the Protozoa, are divided. The Enterozoa all commence their individual existence as a single cell or plastid, which multiplies itself by transverse division. Unlike the cells of the Protozoa, these embryonic cells of the Enterozoa do not remain each like its neighbor and capable of independent life, but proceed to arrange themselves in two layers, taking the form of a sac. The cavity of the two-cell-layered sac or Diblastula thus formed is the primitive gut or arch-enteron. In the Coelentera, whatever subsequent changes of shape the little sac may undergo as it grows up to polyp or jelly-fish, the original arch-enteron remains as the one cavity pervading all regions of the body. In the Coelomata the arch-enteron becomes in the course of development divided into two totally distinct cavities shut off from one another—an axial cavity, the met-enteron, which retains the function of a digestive gut; and a peri-axial cavity, the coelom or body-cavity, which is essentially the blood-space, and receives the nutritive products of digestion and the waste products of tissue-change by osmosis. The Mollusca agree in being Coelomate with the phyla Vertebrata, Platyhelminthia (Flat-worms), Echinoderma, Appendiculata (Insects, Ringed-worms, etc.), and others—in fact, with all the Enterozoa except the Sponges, Corals, Polyps, and Medusæ.

The history of the shell in the development of Azygobranchia (and other Gastropods) is important. Just as the primitive shell-sac aborts and gives place to a cap-like or boat-like shell, so in some cases (*Marsenia*, Krohn) has this first shell been observed to be shed, and a second shell of different shape is formed beneath it.

A detailed treatment of what is known of the histogenesis in relation to the cell layers in these Mollusca would take us far beyond the limits of this article, which aims at exposing only the well-ascertained characteristic features of the Mollusca and the various subordinate groups. There is still a great deficiency in our knowledge of the development of the Gastropoda, as indeed of all classes of animals. The development of the gill (ctenidium) as well as of the renal organ, and details as to the process of torsion of the visceral hump, are still quite insufficiently known.

One further feature of the development of the Azygobranchia deserves special mention. Many Gastropoda deposit their eggs, after fertilization, inclosed in capsules; others, as *Paludina*, are viviparous; others, again, as the Zygobranchia, agree with the Lamellibranch Conchifera (the Bivalves) in having simple exits for the ova without glandular walls, and therefore discharge their eggs uninclosed in capsules freely into the sea-water; such unincapsuled eggs are merely inclosed each in its own delicate chorion. When egg-capsules are formed they are often of large size, have tough walls, and in each capsule are several eggs floating in a viscid fluid. In some cases all the eggs in a capsule develop; in other cases one egg only in a capsule (*Neritina*), or •

small proportion (*Purpura*, *Buccinum*) advance in development; the rest are arrested either after the first process of cell-division (cleavage) or before that process. The arrested embryos or eggs are then swallowed and digested by those in the same capsule which have advanced in development. The details of this history require renewed study, our present knowledge of it being derived from the works of Koren and Danielssen, Carpenter and Claparède. In any case it is clearly the same process in essence as that of the formation of a vitellogenous gland from part of the primitive ovary, or of the feeding of an ovarian egg by the absorption of neighboring potential eggs; but here the period at which the sacrifice of one egg to another takes place is somewhat late. What it is that determines the arrest of some eggs and the progressive development of others in the same capsule is at present unknown.

MOLLUSCOIDS. See **BRACHIOPODA** and **POLYZOA**.

MOLOCH, or **MOLECH**, is the name or title of the divinity which the men of Judah in the last ages of the kingdom were wont to propitiate by the sacrifice of their own children. Human sacrifices were common in Semitic heathenism, and at least the idea of such sacrifices was not unknown to Israel in early times (Isaac, Jephthah's daughter), though in the sunny days of the nation, when religion was a joyous thing, there is no reason to think that they were actually practiced. It was otherwise in the neighboring nations, and in particular we learn from 2 Kings iii. 27, that the sacrifice of his son and heir was the last offering which the king of Moab made to deliver his country. Ahaz's sacrifice of his son (which indeed rests on a somewhat late authority) must have been an isolated act of despair; human sacrifices are not among the corruptions of the popular religion spoken of by Isaiah and Micah. But in the seventh century, when the old worship had sustained rude shocks, and all religion was transformed into servile fear, the example of Manassah spread to his people; and Jeremiah and Ezekiel make frequent and indignant reference to the "high places" for the sacrifice of children by their parents which rose beneath the very walls of the temple from the gloomy ravine of Hinnom or Tophet. It is with these sacrifices that the name of "the Moloch" is always connected; sometimes "the Baal" (lord) appears as a synonym. At the same time, the horrid ritual was so closely associated with Jehovah worship that Jeremiah more than once finds it necessary to protest that it is not of Jehovah's institution. So, too, it is the idea of sacrificing the first-born to Jehovah that is discussed and rejected in Micah vi.

MOLUCCAS, **MOLUCCOS**, or **SPICE ISLANDS**, **THE**, comprise, in the wider use of the term, all the islands of the East Indian Archipelago between Celebes on the west, the Papuan Islands and New Guinea on the east, Timor on the south, and the open Pacific on the north. They are thus distributed over an area measuring about 450 miles from east to west, and about 800 from north to south, and include—(1) the Moluccas proper or Ternate group, of which Jilolo is the largest and Ternate the capital; (2) the Batchian, Obi, and Sula groups; (3) the Ambon or Amboyna group, of which Ceram (Serang) and Buru are the largest; (4) the Banda Islands (the spice or nutmeg islands *par excellence*), of which Lanoir or Great Banda is the largest, and Neira politically the most important; (5) the southeastern islands, comprising Tenimber or Timor-Laut, Larat, etc.; (6) the Kei Islands and the Aru Islands, of which the former are sometimes attached to the southeastern group; and (7) the southwestern islands or the Babber, Sermatta, Letti, Wetter, Roma, and Damme groups.

At the close of the sixteenth century this part of the archipelago was divided among four rulers settled at Ternate, Tidore, Jilolo, and Batchian. The northern portion belongs to the Dutch residentship of Ternate, the southern portion to that of Amboyna.

MOLYBDENUM, one of the rarer metallic elements, occurs in nature chiefly in the two forms of Yellow Lead Ore and Molybdenite. The latter mineral is very similar in appearance and in mechanical properties to graphite or black lead, and, in fact, was long confounded with it chemically, until Scheele, in 1778 and 1779, proved their difference by showing that only the mineral now called molybdenite yields a white earth on oxidation. The metallic radical of the earth, after its discovery by Hjelm, was called molybdenum.

MOMBASA, or less correctly **MOMBAS**, the *Mwita* of the Sawahili, a town on the east coast of Africa, with the best harbor on all the Zanzibar mainland. The coralline island of which it occupies the eastern portion is three miles long by two and a half broad, and lies in the middle of a double inlet of the sea stretching northward into Port Tudor (so called after the English officer who surveyed it) and westward into Port Reitz (after the English resident who died while exploring the Pangani river in 1823). The citadel, originally constructed by Xeixas and Cabrera in 1635, still remains in good condition. Of the twenty Portuguese churches which Mombasa once contained, only two or three can be identified. A few of the houses are built of stone, but most of them are mere thatched huts. In 1857 Burton estimated the inhabitants at 8,000 to 9,000, and in 1883 they numbered about 20,000.

MONACHISM. The word Monachism, or Monasticism, primarily meaning the act of "dwelling alone," has come, by an easy and natural transition, to denote the corporate life of religious communities living a life of poverty, celibacy, and obedience, under a fixed rule of discipline. The root-idea of monachism, in all its varieties of age, creed, and country, is the same—namely, retirement from society in search of some ideal of life which society cannot supply, but which is thought attainable by abnegation of self and withdrawal from the world. This definition applies to all the forms of monachism which have left their mark on history, whether among Bráhmans, Buddhists, Jews, Christians, Moslems, or the communistic societies of the present day, even when theoretically anti-theological.

The question has been warmly debated whether monachism be an evil or a good—whether a natural, perhaps a necessary, part of Christianity (as being, indeed, the strict logical issue of the triple vow of baptism, literally construed), or a foreign element introduced into it with unfortunate results, and rather an excrescence on its system than an orderly and healthy development. Unlike many other institutions which have needed the lapse of centuries and the gradual approach of decay and degeneracy to show their weak places, monachism in its Christian form displays some of its most unlovely features while yet almost in its cradle, whereas not a few of its best achievements belong to a late period in its history; and it has throughout displayed a singular elasticity and power of taking a fresh departure, after seeming to have exhausted its energies. Its champions and its opponents have thus always had ample materials for their briefs, and there is little probability of the controversy ever coming to an end. But the most philosophical mode of viewing its relation to Christianity is to recognize that monachism has made a part of every creed which has attained a certain stage of ethical and theosophical development; that there is a class of minds for which it has always had a powerful attraction, and which can otherwise find no satisfaction; and conse-

quently that Christianity, if it is to make good its claim to be a universal religion, must provide expression for a principle which is as deeply seated in human nature as domesticity itself, albeit limited to a much smaller section of mankind.

Three main factors combined to produce the phenomenon of monachism in early Christianity, each of them set in motion by the general dissolution of morals in the pagan society of the time, of which we get a sufficient glimpse from the Christian standpoint in the first chapter of the Epistle to the Romans, and from the pagan standpoint in the sixth Satire of Juvenal. These three factors were—(1) the Oriental tendency toward retirement, contemplation, and asceticism, influencing the infant Christian church through the agency of those Jewish ascetics, the Essenes and Therapeutæ, who had begun long before the gospel times both the solitary and the common life in Palestine and Egypt, and who probably contributed many converts to Christianity, and became practically merged therein, as they disappear from history in the first century of the Christian era; (2) the Hellenic teaching of the Alexandrine Neo-Platonists on the purification of the intellect by abstention from physical indulgence; and (3), perhaps a more powerful influence than either, that old Roman spirit of austerity and discipline which, while looking back regretfully to the memories of the simpler habits of republican times, could find nothing amidst the social luxury and administrative weakness of the decaying empire which presented its ideal, save the monastic system with its rigid proscription of luxury, and even of comfort, in every form. Elijah and John the Baptist furnished examples of the solitary hermit type; the Schools of the Prophets at least seem to have been celibate and cœnobitic communities, living by a fixed ascetic rule; and it is familiar to all that such was the actual discipline of the Essenes (see ESSENES).

There are five main classes of monastic institutions, each of which approximately marks a new departure in the history of Western monachism (for the East has never had more than the first), as they succeed one another in chronological order, without in any instance involving the abandonment of the previous foundations. They are—(1) Monks; (2) Canons Regular; (3) Military Orders; (4) Friars; (5) Clerks Regular. All of these have communities of women, either actually affiliated to them, or formed on similar lines.

It has been already mentioned that the bad side of monachism appears almost as early as its good side. While the system won the admiration of all the most eminent Christian teachers of the age which saw its birth and early growth, and while we are met by a still more remarkable fact that from the time when monachism was fairly established till we enter on the Middle Ages there are but two or three names of distinction among the clergy, whether as writers or administrators, to be found outside the ranks of monachism, among whom the most famous are Ambrose and Leo the Great, nevertheless, there is a heavy account on the other side. Not only did the institute speedily find itself caricatured by the Messalians, Euchites, Gyrovagi, Sarabaites or Remoboth, Circumcelliones, and other companies of professed ascetics, wild in doctrine, vagrant in habits, and turbulent in conduct, but the more genuine societies had scarcely fewer faults in too many cases. Severe asceticism operates differently on different natures, and while there are some whom it does but discipline and refine there are more whom it tends to coarsen and to brutalize, even apart from the many whom it is apt to affect with morbidness, if not actual insanity. And it is unquestionable that vast numbers of those who entered on the monastic life came from the poorer classes,

in search of some less toilsome mode of existence than they had previously led, preferring the contemplative societies, wherein almost no labor, certainly none of a severe and trying cast, was practiced, to those where agriculture and other active employments, requiring more energy than mat and basket weaving, were enjoined. Such men, uneducated and undisciplined, were liable to be thrown entirely out of gear by the complete revolution in their mode of life—especially when the community they joined was not only contemplative, but situated in some place where the ungrateful soil made tillage nearly impracticable, and the vast numbers crowded together were far too numerous for any tasks which could be assigned them. From the bosom of such societies came not only single examples of exaggerated spiritual pride, bitter fanaticism, avaricious greed of the scanty articles whose usufruct was permitted, fierce sensuality, and wild religious delusions, but they gave birth to companies like the “grazing monks,” of Mesopotamia and Palestine, who roved about, shelterless and nearly naked, in the mountains and deserts, groveling on the earth, and browsing like cattle on the herbs they casually found; and to those fierce bands of Nitrian and Syrian ascetics who, reared in the narrowest of schools, treated any divergence from their own standard of opinion as a crime which they were entitled to punish in their own riotous fashion, two instances of which have left an indelible brand on their history—the murder of Hypatia in Alexandria, and that of the patriarch Flavian at the Robber Synod of Ephesus. An equally singular, but more sporadic and temporary, form of asceticism was that of the Stylites or Pillar-hermits, who followed a fashion first set by Simeon, a Syrian monk who spent almost half of the fifth century on the summit of a column sixty feet in height. This unwonted kind of austerity at first gave rise to strong objections, even from hermits themselves, and a messenger was sent to Simeon, bidding him in the name of a synod of bishops to descend from his pillar, but with instructions to permit him to remain if he showed himself ready to comply.

The history of monachism in the West is far more varied, chequered, and interesting than in the East. It takes its beginning from the visit of Athanasius to Rome in 340, during his second term of exile, when he brought with him his *Life of St. Anthony*, and pressed his example on the Roman Christians who mourned as patriots, not less than as devotees, over the lax and enervated habits of society. The popular imagination was caught at once, and not only was the basis of monachism successfully laid in Rome itself, but Eusebius of Vercelli introduced it into northern Italy, where it was fostered a little later by the illustrious Ambrose at Milan. From the very beginning a marked difference shows itself in the spirit of Western monachism as compared with the parent institute in the East. Partly from dissimilarity of climate, but still more from that of racial and national temperament, there has always been less tendency in the West to either abstract contemplation or severe self-torture, such as is equally common to many of the Egyptians or Syrian ascetics and to the Jogis of Hindustan. Hard work, with due intervals for food and recreation, occupied all that part of a Western monk's time which was not devoted to prayer or study, and a careful apportionment of his duties throughout the day gave each hour its appointed task to be fulfilled, leaving very few loose ends of time to be wasted.

Swiftly as monachism spread in Europe during the breaking-up of the Western empire, some of the causes which hastened its progress also tended to its rapid decay. The disturbed state of society, and, in particular, the prevalence of petty warfare, drove many thousands

of persons to seek a quiet refuge in the cloister without any more directly religious motive. When once there, they found in every place some rule in force which was either imported directly from Egypt or Syria, or else, like that of Cæsarius, modeled on Eastern lines, and therefore ill suited to the severer climate of Europe and the more active habits of the people. The austerities were thus too oppressive for general observance, and the result was a widespread neglect of rules which continued nominally in force, while at the same time the very monks who had ceased to keep them laid claim to special sanctity on the pretense of their strict way of life.

The special eminence of the Benedictines, in which they were without even the semblance of rivalry till the Jesuits arose, is that they were a missionary, civilizing, and educational body. It was as teachers of what for those times was scientific agriculture, as drainers of fens and morasses, as clearers of forests, as makers of roads, as tillers of the reclaimed soil, as architects of durable and even stately buildings, as exhibiting a visible type of orderly government, as establishing the superiority of peace over war as the normal condition of life, as students in the library which the rule set up in every monastery, as the masters in schools open not merely to their own postulants but to the children of secular families also, that they won their high place in history as benefactors of mankind. No doubt there was another side to this picture, even before the order began to deteriorate collectively; but the good actually effected far exceeded the evils which may have accompanied it. Ireland was the true stronghold of Celtic monachism, and before the close of the fifth century was already thickly planted with religious houses.

The tenth century—emphatically the “Dark Age” or “Age of Lead”—was the time when monachism, both in East and West, touched its lowest point. Three causes contributed to this in the West. First may be placed the raids of the Northmen; next, the growth of the feudal system, converting abbots into secular lords in virtue of the lands held by their monasteries being chargeable with feudal obligations; and lastly, the seizure and impropriation of monastic revenues by kings, princes, and bishops. The last of these causes was at work in the East also, further complicated, as we learn from the decrees of a council held at Constantinople in 861, by the foundation of monasteries intended from the first merely as sources of pecuniary advantage to the founders; although the success of Greek monks in the conversion of Bulgaria, Moravia, and, somewhat later southern Russia, showed that the cloister had not become quite effete even under the conditions of the Byzantine empire in that era.

The military orders arose in a more accidental fashion than any other variety of monachism, being due to the desire felt to lessen the perils which attended pilgrimage to Jerusalem, then almost as much part of the religious craving of Christendom as the hajj to Mecca is with devout Moslems. The Templars were at first designed only as an armed escort to protect the visitors from attack, and the idea of permanent guardianship of the Holy Places did not shape itself till later; while the Hospitalers (afterward famous as Knights of Rhodes and of Malta, as the main bulwark of Christendom against the Turks, and as maintaining the police of the Mediterranean against all pirates and rovers), borrowed the first idea of their institute from the knightly order of St. Anthony of Vienne, founded in Dauphiné about 1095, and devoted themselves originally to tending sick pilgrims at Jerusalem. The Teutonic Knights date from the third crusade, and owe their foundation to the sufferings of the duke of Swabia’s army at the siege of

Acre, as it would seem that the Hospitalers were either unable or unwilling to supply the needed assistance. The military orders passed away when their work was ended; the Templars, as the victims of a great crime, closed by a ghastly tragedy; the Hospitalers, and those Spanish and Portuguese orders which were enrolled as regiments against the Arab invaders of the Peninsula, though titularly still existing, yet really ceased to be more than a name when the Moslem power in Europe was finally broken.

Yet another fresh departure in the history of monachism, in some respects the most momentous of all, was taken in the thirteenth century by the institution of the Mendicant Orders, or Friars. Pope Innocent III., in the thirteenth of the seventy constitutions or canons he promulgated at the Lateran council in 1215, had expressly forbidden the foundation of any new orders, bidding all who desired to embrace the monastic life join some approved community, and similarly directing that such as desired to found new houses should take their rule and constitution from one of the recognized societies. But circumstances were too strong for him, and this very pope was destined himself to sanction two of the most remarkable societies which the Latin Church has ever produced.

The two men founding those societies were Francis Bernardone of Assisi and Dominic Guzman of Osma. The ruling idea in the mind of the former was the elevation of poverty to the first place among Christian graces, as the most obvious way of conforming the life of a Christian to that of the founder of his faith; the more intellectual Spaniard dreamed of an aggressive body of skillfully-trained preachers, able at once to grapple with the subtle dialectic of the enemies of the established creed, and to appeal in clear and homely language to the uneducated, among whom the Albigenses and other sectaries were making considerable conquests. Both the new founders sought and obtained at Rome, after some difficulty, the approval of their new institutes, and that in the very year 1215 which had seen the formal prohibition of all fresh orders.

The Franciscan institute was a bold attempt to democratize the church; Dominic’s Friar Preachers, though recruited freely from men of a humble grade, have always had somewhat more of an aristocratic tone about them, due to their intellectual calling; they have held a high place in Christian art, counting among them such names as Fra Angelico and Baccio della Porta; and their reputation for orthodoxy and for a purer type of moral theology than the Jesuit one has always stood high. They also count among their members the two most eminent divines of the Middle Ages, Albertus Magnus and Thomas Aquinas, and they have been fruitful in producing zealous missionaries; but the one great blot on their career is that they have been the directors and officials of the Inquisition ever since the formal constitution of that tribunal as a permanent organization. The Franciscans, less distinguished for mental triumphs than their competitors, have yet some famous names, chief of which are Duns Scotus and Roger Bacon—for Bonaventura, though set by the Franciscans as the “Seraphic Doctor” in competition with Aquinas, the “Angelic Doctor” of the Dominicans, is scarcely entitled to very high intellectual rank—and at one time they seemed likely to establish as firm a hold on the university of Oxford as the Dominicans did on that of Paris. The swiftest success and popularity attended the two new orders; privileges and exemptions were showered on them from Rome; wealth, in despite of their vow of mendicancy was emulously thrust upon them by the laity; and, above all, a remarkable and widespread religious revival, a dead-lift to ministerial efficiency in

every direction, repaid their early labors, while they had between them almost a monopoly of the popedom for nearly two hundred years. But their very success was fatal to their character. The vow of poverty was the first part of their institute to break down. Even before they began to be counted among the richest orders of Christendom, there is indisputable evidence—that of Bonaventura, himself general of the Franciscans—that the mendicant system was working nothing but mischief.

As the thirteenth century is the apogee of later monachism, so the decline begins steadily at the very outset of the fourteenth (which is also the date of ordination becoming the normal custom for choir-monks, instead of the exception as formerly), continuing down to the crash of the Reformation. The great schism of the West, the rise of the Wycliffites and Lollards in England, and of the body later known as Hussites in Bohemia, could not fail to act injuriously on the monastic orders; and though the creation of fresh ones continued, none of those founded during this era were influential, and few durable.

In the Reformation era itself the monastic bodies had sunk so low in the estimation of even the rulers of the church that one clause in the report of the committee of cardinals appointed by Pope Paul III. (a body composed of Sadolet, Contarini, Reginald Pole, Giberti, Fregoso, Badia, Aleandro, and Caraffa, afterward Paul IV.), delivered in 1538, demanded their abolition.

The interests involved were, however, too vast and complicated, the supposed impolicy of an admission on so large a scale of the charges alleged against monachism by the men of the New Learning too serious, to allow of any such sweeping measure of reform as that proposed by the cardinals being carried out. A certain amount of discouragement shown toward the older societies; the enactment of some partial corrections by the council of Trent, not touching any principle whatever, but apparently saying something because public feeling looked for something to be said; and, above all, the creation of a new type of order, the famous Company of the JESUITS (1534), represent the total action taken by the Roman Church during the actual crisis of the Reformation.

At the French Revolution, the religious houses, amounting (without reckoning various minor colleges and dependent establishments) to 820 abbeys of men and 255 of women, with aggregate revenues of 95,000,000 livres, were suppressed by the laws of February 13, 1790, and August 18, 1792. In Germany the storm had broken somewhat earlier, if not quite so violently. The Thirty Years' War had wrought much mischief to not a few of the religious houses, without taking into account the great number which had been destroyed in the territories of the Protestant princes; and when the death of Maria Theresa in 1780 left her son Joseph II. free to act as he pleased, he dissolved the Mendicant orders, and suppressed, in despite of the personal remonstrances of Pius VI., the greater number of monasteries and convents in his dominions. In Italy despite the multiplication of new institutes, the process of decay continued throughout the seventeenth century.

The terrible crash of the French Revolution, which affected, directly or indirectly, every country in Europe, was not least influential in its incidence on monachism. On the one hand, the actual destruction which it brought upon the religious houses of France was adopted as part of the revolutionary programme in all countries where such institutions were still intact; and, on the other, there was a considerable measure of improvement brought about in not a few places by the fear of public opinion, while the new institutes which continued to spring up were all but invariably active, both

founders and the sanctioning authorities recognizing that any society seeking to make its footing good must needs first prove its capacity for practical usefulness. In France itself the laws which abolished all religious communities were relaxed by connivance in favor of the Sisters of Charity even under the Terror and the Directory; while in 1801 a decree of the Consular Government, issued by the Minister of the Interior, authorized Citizeness Duleau, former superior of that society, to revive it by taking young women to train for hospital work and various other active communities were restored by Napoleon in 1807. Further revivals took place at the Restoration, the most celebrated of which was the Dominican, owing to the talents and eloquence of Lacordaire and the group he gathered round him; but Benedictines, Carthusians, Trappists, and other societies of the older type were not slow to avail themselves of the opportunity to return and to found anew, amidst a poverty which recalls the original institution, their abbeys and priories. But they met with little favor under the Orleanist monarchy, and the Second Empire was their time of most security and progress. Since its fall, they have again been actively discouraged by a strong party in the Republic, and their position remains precarious. France has been, further, the chief seat of the many new societies founded for some especial department of charitable work, the most characteristic example of which is perhaps that of the Little Sisters of the Poor.

The fall of the religious houses in Spain dates from the law of June 21, 1835, which suppressed 900 monasteries at a blow, and the remainder had but a short respite, as they were dissolved on October 11th of the same year. In Portugal, where a bias against the Roman Curia has been a traditional part of patriotism ever since the revolution of 1640, when the pope sided with Spain against the house of Braganza, there was little feeling to protect the monasteries when it happened that the crown wanted their possessions, and they were all suppressed by the decree of May 28, 1834. No European country had so many religious houses as Portugal in proportion to its population and area, and the number of the foundations dissolved in 1834 exceeded 500. In Switzerland a considerable measure of suppression followed the war of the Sonderbund in 1847, while in Italy, the last country where monarchism had remained almost unmolested, an act was passed in the Sardinian Parliament on July 7, 1866, for the suppression of monasteries within the Piedmontese dominions, and for the confiscation of their property. The measure was extended to the whole of Italy after the unification of the kingdom; the orders were expropriated in 1873; their houses were declared national property, and were put to secular uses, no exception being made in favor of San Marco at Florence, of Assisi, of Vallombrosa, or even of Monte Cassino itself.

On the other hand, several Roman Catholic societies have attained considerable success in the United States and Canada, thus in some degree recovering for the principle they represent part at least of the ground lost in Europe, while in three religious communions outside the pale of the Latin obedience—the Evangelicals of Germany, the Reformed of France, and the Church of England—the organization of women for charitable and religious work on the lines of various old institutes has been actively carried out.

MONACO, the smallest of the sovereign principalities of Europe, with an area of 8.34 square miles, a population of 7,049, and an army of seventy-two men, is situated on the coast of the Mediterranean, nine miles east of Nice, and bounded on all sides by the French department of the Maritime Alps. Previous to 1861,

when the communes of Mentone (Menton) and Rocca-bruna (Roquebrun) were sold to France for 4,000,000 francs, the area was about a third larger; but the population, which with those portions again included would now be 15,000, was only about 8,000. Monaco has long had the reputation of being one of the most beautiful and sheltered spots on all the Franco-Italian coast. The town occupies the level summit of a rocky headland, rising about 195 feet from the shore, and still surrounded with ramparts. Though largely modernized, the palace is a fine specimen of Renaissance architecture. The gaming establishment is now in the hands of a joint-stock company with a capital of 15,000,000 francs. None of the inhabitants of Monaco have access to the tables; and their interest in the maintenance of the *status quo* is secured by their complete exemption from taxation, and the large prices paid for their lands. Gambling-tables were set up at Monaco in 1856; but it was not till 1860, when M. Blanc, expelled from Homburg, took possession of the place, that Monte Carlo began to be famous.

MONAGHAN, an inland county of Ireland in the province of Ulster, is bounded east by Armagh, south-east by Louth, south by Meath, southwest by Cavan, west by Fermanagh, and north by Tyrone. The area is 318,806 acres, or 498 square miles. The northwestern part of the county is included in the great central plain of Ireland; but in the southeast there is an uprising of Lower Silurian rocks.

The area of arable land was 278,755 acres, or 87 per cent. of the whole, while 5,258 were under plantations, 7,580 bog and marsh, 5,239 barren mountain land, and 21,582 water, roads, and fences. The only manufacture of consequence is linen, which of late years has been on the increase. The population in 1841 was 200,442, but in 1851 it had diminished to 141,823, in 1871 to 114,969, and in 1881 to 102,748, of whom 50,077 were males and 52,671 females.

MONARCHIANISM, in its technical Christological sense, designates the view taken by those Christians who, within the church, toward the end of the second century and during the third, opposed the doctrine of a hypostatic Logos (hypostasianism) or of an independent personal subsistence of the Divine Word.

MONASTICISM. See MONACHISM.

MONASTIR, BITOLIA, or TOLI MONASTIR, a city of Macedonia, now the chief town of the Turkish vilayet of Roumelia, is situated at a height of 1,880 feet above the sea, in a western inlet of the beautiful, fertile, and many-villaged plain which, with a breadth of about ten miles, stretches for forty miles eastward from Mount Peristeri (7,714 feet high) to the Babuna chain. The population is about 40,000.

MONBODDO, JAMES BURNETT, LORD, author of works on the *Origin and Progress of Language* (published in 1773), and *Ancient Metaphysics* (1779), was one of the most marked characters in Scottish literary circles in the eighteenth century. He was born in 1714, and died in 1799.

MONCTON, a town of the Dominion of Canada, in Westmoreland, New Brunswick, eighty-nine miles by rail northeast of St. John, is a port at the head of navigation on the Petitcodiac, and the seat of the workshops and general offices of the Intercolonial Railway. Population, 6,000.

MONDONEDO, an ancient city of Spain, twenty-even miles north-northeast from Lugo, in the province of that name, is situated on the Sixto, a small tributary of the Masma, on the Atlantic side of the Cantabrian chain, in a sheltered site surrounded on all sides by considerable hills. The population is 11,000.

MONDOVI, a city of Italy, in the province of Cuneo,

fifteen miles east of Cuneo and about fifty-five miles west of Genoa by rail, was formerly the chief town of the Sardinian province of Mondovì, and between 1560 and 1719 the seat of a Piedmontese university. Population (1890), 19,000.

MONEY. The precise definition of Money is a question presenting no small difficulty, and it has been complicated by the attempts of some writers to define the term so as to lend support to their favorite theories. The real difficulties of the subject are, however, chiefly connected with paper-money, and as that side of the question has been dealt with in the article BANKING it will here be sufficient to adopt the clear and careful description of money given by a distinguished American economist as being "that which passes freely from hand to hand throughout the community in final discharge of debts and full payment for commodities, being accepted equally without reference to the character or credit of the person who offers it and without the intention of the person who receives it to consume it or enjoy it or apply it to any other use than in turn to tender it to others in discharge of debts or payment for commodities." The functions which money discharges in the social organism are—at least in the opinion of all writers worth noticing here—clearly manifest. The most important is that of facilitating exchanges. It is not necessary to dwell on the great importance of this office. The mere consideration of industrial organization shows that it is based on the division of employments; but the earliest economic writers saw clearly that division of employments was rendered possible only by the use of a medium of exchange. They saw that the result of increasing specialization of labor was to bring about a state of things in which each individual produced little or nothing directly adapted to satisfy his own wants, and that each one was to live by exchanging his products for those of others. They saw, moreover, that this was not feasible without some object which all would be willing to accept for their peculiar products, for otherwise, the difficulty of getting those together whose wants were reciprocal would be a complete hindrance to the development of exchange, which alone made division of labor possible. A second function hardly inferior in importance to the one just mentioned is that of affording a ready means of estimating the comparative value of different commodities. Without some common commodity as a standard of comparison this would be almost impossible. Indeed it may be reasonably maintained that the idea of general value could not be formed without the existence of money, and all that is known of savage races tends to bear out this view. The adoption of some one commodity renders the comparison of values easy. The chosen commodity becomes a *common denominator* or *common measure of value* in terms of which we estimate the values of all other goods, and thus money, which in its primary function renders exchanges possible by acting as an intermediate term in each exchange, also makes exchanges easier by making them definite. Another function of money comes into being with the progress of society. One of the most distinctive features of advancing civilization is the increasing tendency of people to trust each other. Thus there is a continual increase in relations of contract, as may be seen by examining the development of any legal system. Now a contract implies something to be done in the future, and for estimating the value of that future act a standard is required; and here money, which already acts as a *medium of exchange* and as a *measure of value* at a given time, performs a third function, by affording an approximate means of estimating the present value of the future act, and in this respect may be regarded as a *standard of*

value, or, if the phrase be preferred, of *deferred payments*. Some writers attribute a fourth function to money, inasmuch as they regard it as being a means of easily storing up value.

The problem of the determining causes of the value of money is a particular case of the general problem of values, but there are circumstances which render the inquiry more than usually complicated. Before considering these it will be well to deal with a use of the phrase "value of money" which has led to much confusion. In mercantile phraseology the value of money means the interest charged for the use of loanable capital. Thus, when the market rate of interest is high, money is said to be dear, when it is low, money is regarded as cheap. Whatever may be the force of the reasons in favor of this use, it is only mentioned here for the purpose of excluding it. For our present subject, "the value of a thing is what it will exchange for; the value of money is what money will exchange for, or its purchasing power. If prices are low, money will buy much of other things, and is of high value; if prices are high, it will buy little of other things, and is of low value. The value of money is inversely as general prices, falling as they rise and rising as they fall." Now in the general theory of value it appears that the *proximate* condition which determines it is the equation between supply and demand; and this is clearly the case with reference to money. These terms, supply and demand, need, however, some elucidation. The supply of a commodity means the quantity of it which is offered for sale. But in what shape does the sale of money take place? By being offered for goods. "The supply of money, then, is the quantity of it which people are wanting to lay out;" or, to put the point more concisely, it is "all the money *in circulation* at the time." Again, to take the case of demand—the demand for a commodity is the purchasing power offered for it. Demand in the special case of money consists of all the goods offered for sale. There is, however, a peculiar feature in the case of money which arises from its position as the medium of exchange, viz., that money is, so to say, in a "constant state of supply and demand," since its principal service is to act as the means of purchasing commodities. From this it follows that the factors which determine the value of money within a given time are: (1) the amount of money in circulation, and (2) the amount of goods to be sold. On closer examination it will, however, appear that there are other elements to be taken into account. In the first place, the quantity of money is not by itself the sole element on the supply side. In some instances a coin will not circulate more than two or three times in a year, while another coin may make hundreds of purchases. In determining the value of money these varying rates of circulation have to be considered. On the side of demand, again, it is not the quantity of commodities that is the determining element, but the amount of sales, and the same article may, and generally does, pass through several hands before it reaches the consumer. From this it follows that (if the consideration of credit in its various forms be omitted) the value of money is inversely as its quantity multiplied by its efficiency, the amount of transactions being assumed to be constant.

It must be noticed that it is not commodities only that are exchanged for money. Services of all kinds constitute a large portion of the demand, while the payment of interest on the various forms of obligation requires a large amount of the circulating medium. The potent influence of credit also must be dwelt on. This latter force is the main element to be considered in dealing with variations of prices; but so far as it is based on a deposit of metallic money it may be looked on as a means of increasing the efficiency of money, and

therefore as coming within the formula given above. In its other aspects it lies outside the range of this article. Some interesting conclusions may be deduced from the results we have arrived at. One of these is that the "increased development of trade," or "expansion of commerce," *of itself* tends to lower not to raise prices; for, by increasing the work which money has to do while the amount remains the same, it raises its value. Another consequence is that a large addition may be made to the money in a country without any effect being produced on prices. This is evident, since money only acts on prices by being brought into circulation; therefore, if the money which is added to the national stock is not used in this way, prices will remain unaffected.

We have now sufficiently considered the proximate conditions which determine the value of money; the next step is to inquire: What is the ultimate regulator of its value? The value of freely-produced commodities is—according to the ordinary theory of economists—determined by their "cost of production," or, where the article is produced at different costs, by the cost of production of the most costly portion. Gold and silver, the principal materials of money, are the products of mines, and are produced at different costs; therefore the cost of the part produced at greatest cost ought to determine their value. This theory is, however, true only under certain conditions—namely, that competition is perfectly free, and that there are accurate data for computing the cost of production, and even then it is true only in the long run. Moreover, cost only operates on value by affecting supply. In former periods it was a common proceeding on the part of the state to either restrict or stimulate coinage and mining for the precious metals. At all times the working of gold and silver mines has been rather a hazardous speculation than a legitimate business. With regard to the adjustment of supply to meet an altered cost of production, the difficulties are, if possible, still greater. The supply of money is so large compared with the annual production, that any change can operate but slowly on its value. The total stoppage of fresh supplies from the mines would not be felt for some years in the increased value; and an increased amount of production, though more rapid in its operation, takes some time to produce an effect. "Hence the effects of all changes in the conditions of production of the precious metals are at first, and continue to be for many years, questions of quantity only, with little reference to the cost of production." On these grounds it is apparent that cost of production is not, for short periods, the controlling force which governs the value of money, and even for long periods the speculative nature of the industries connected with the production of money renders the cost of production an element very hard to ascertain. Another consideration which gives a peculiar feature to the problem of money-value is that in the case of other commodities a change in the cost of production affects value without any actual change in the supply. The knowledge that a commodity can be produced at a lower cost will cause a reduction in its value. This is not true of money. Either the quantity or the efficiency of money must be altered to change its value.

The next question which arises is: What quantity of money does a nation require? What amount of the circulating medium is necessary for the proper working of the industrial organism? To this puzzling problem the earlier economists gave answers in the shape of definite formulæ. Modern statisticians, however, though having command of much greater resources, decline to attempt a quantitative answer, and content themselves with indicating the conditions which the problem involves. In fact, we must first examine the work which money

has to perform, and this depends on several conditions. The first of these is the population; *ceteris paribus*, twice as many people will want twice as much money. The second is the amount of transactions; for, if the amount of business done is doubled, the amount of money must also be doubled, unless at the same time some improvement in credit is introduced. The efficiency of money is a third element which affects the quantity needed, and this is largely dependent on the habits of the people and the facilities for communication. Another factor which requires to be estimated is the extent to which habits of hoarding exist; for all money hoarded is withdrawn from circulation, and therefore increases the total amount needed. The habits of saving in the rural districts of France remarkably exemplify this element in the question. Again the existence of barter does away with the use of so much money as would be required to carry on the exchanges effected by barter. The custom of paying wages in kind has a similar effect. This bare statement shows how insoluble the question is. When we contemplate the matter from an international point of view, the amount needed, after allowance is made for the cost of transporting goods, is plainly that which will keep a country's prices at a level with those of the countries with which it has commercial relations. For otherwise the country would have an excess either of importation or of exportation, which would necessitate a flow of money to the country whose prices were lower than the general level. This, then, is the condition which determines comparative prices between different countries; and prices being so determined, the quantity of money needed to keep up those prices depends on the conditions above indicated.

The use of metals as a form of money can be traced far back in the history of civilization, but, as it is not possible to ascertain the historical order of their respective adoptions for this purpose, we will take them in the order of their value, beginning with the lowest. Iron, judging from the statement of Aristotle, was extensively employed as currency. Lead has also served as money, as it does at present in Burmah. Copper has been more widely employed than either of the previously-mentioned metals. The early Hebrew coins were chiefly composed of it, while down to 269 B.C. the sole Roman coinage was an alloy of copper. Till a very recent period it formed the principal money of some poorer European states (as Sweden), and was the subsidiary coinage of the United Kingdom till the present bronze fractional currency was introduced. Tin was not so favorite a material for money as copper, but the early English coinages were composed of it, probably on account of the fertile tin mines of Cornwall, and in later times halfpence and farthings of tin have been struck. The next metal which comes into notice is silver, which up to the last few years was the principal form of money, and even still is able to dispute the field with its most formidable rival. It formed the main basis of Greek coins, and was introduced at Rome in 269 B.C. The mediæval money was principally composed of silver, and its position in recent times will have to be subsequently noticed more at length. Gold, which is the most valuable of the metals widely used for monetary purposes, has been steadily gaining ground with the growth of commerce. The earliest trace of its use in common with that of silver is to be found in the pictures of the ancient Egyptians weighing in scales heaps of rings of gold and silver. The only other metals used for money—platinum and nickel—may be easily disposed of. The former of these was coined for a short time by the Russian Government, and then given up as unsuitable. The latter is only used as an alloy, and in the United States for a petty coin.

The examination of the forms of currency, both metallic and non-metallic, in which we have been engaged leads to certain definite conclusions as to the course which the evolution of currency is pursuing. It appears that the metals tend to supersede all other forms of money among progressive peoples, and that certain metals tend to supersede the others. From this we are led to consider the qualities which are desirable in the material of money, and to conclude that the presence or absence of those qualities is the reason of the adoption or rejection of any given substance.

In the first place, it is necessary that the material of money should be desirable, or, in other words, possess value; and to this condition all the commodities we have reviewed conform, for otherwise they would never have attained the position of being a medium of exchange. This quality, then, is not the reason for the preference of some forms over others. The second requisite clearly is that the value of the article shall be high in proportion to its weight or bulk, or, to put the same truth in another way, it is requisite that it shall be portable. Want of this quality has been a fatal obstacle to many early forms of money retaining their place. Skins, corn, and tobacco were found very difficult to transfer from place to place. Iron and copper too suffered from the same defect, while sheep and oxen, though moving themselves, were expensive to transfer. It is further desirable that the material of money shall be the same throughout, and that one unit shall be equal in value to another. The metals possess a particular advantage in this respect, as, after being refined, they are almost exactly homogeneous. A fourth requisite is that the substance used as money can without damage be divided and, if needed, united again. Money must also be durable. Money should be easily distinguishable, and there should be no trouble in ascertaining its value. This condition is one of the reasons why precious stones have never been much used as money, their value being hard to estimate. The same objection applies to most non-metallic currencies, and is only obviated even in their case by the process of assaying. The last condition which appears desirable for the money material is, that its value shall be steady. It is enough for the other purposes of money that it shall not vary within short periods, which is found to be a feature of metals, and especially of silver and gold, while corn especially varies widely in value from season to season. From the foregoing examination of the requisites desirable in the material of money it is easy to deduce the empirical laws which the history of money discloses, since metals, as compared with non-metallic substances, evidently possess those requisites in a great degree. They are all durable, homogeneous, divisible, and recognizable, and in virtue of these superior advantages they are the only substances now used for money by advanced nations.

The elimination of the cheaper metals leaves silver and gold as the only suitable materials for forming the principal currency. Of late years there has been a movement toward the adoption of the latter as the sole monetary standard, silver being regarded as suitable only for a subsidiary coinage. Indeed this question may be regarded as the principal matter of controversy in the field of metallic currency. The special features of gold and silver which render them the most suitable materials for currency may here be noted. "The value of these metals changes only by slow degrees; they are readily divisible into any number of parts which may be reunited by means of fusion without loss; they do not deteriorate by being kept; their firm and compact texture makes them difficult to wear; their cost of production, especially of gold, is so considerable that they possess

great value in small bulk, and can of course be transported with comparative facility; and their identity is perfect." The possession by both these metals of all the qualities needed in money is more briefly but forcibly put by Cantillon when he says that "gold and silver alone are of small volume, of equal goodness, easy of transport, divisible without loss, easily guarded, beautiful and brilliant, and durable almost to eternity." This view has even been pushed to an extreme form in the proposition of Turgot, that they became universal money by the nature and force of things, independently of all convention and law, from which the deduction has been drawn that to proscribe silver by law is a violation of the nature of things.

The earliest systems of currency whose progressive debasements it is possible in any degree to trace are those of the various Greek states, though even here many details remain in obscurity. The Roman currency system is comparatively better known; while for the mediæval currencies from the time of Charlemagne (800 A.D.) elaborate materials are available, which naturally increase in bulk and precision as we approach more modern times. The general treatment of the history of coins belongs to NUMISMATICS (*q.v.*); but the history of monetary depreciations is important in connection with the theory of money as illustrating the value of sound economic knowledge.

Until coinage became a state function a continued debasement was impossible, since it was open to any one to refuse the money offered in payment if it was not up to the proper standard. When, however, coinage became a function of government, strong motives for debasement soon presented themselves. Whatever may be the inducements to enter on the perilous course of tampering with the monetary standard, a long experience has incontestably proved its disastrous effects. One of the great causes of the weakness of France during the "hundred years' war" was the extremely debased state of its currency, and the dread of further reductions in the value of the coins. Lord Macaulay has given a graphic picture of the evils which England suffered from its depreciated silver currency toward the end of the seventeenth century. So manifest are the evils that result from debasement that it may be reasonably hoped that all civilized governments have abandoned the practice for ever; though, unfortunately, similar bad effects are produced by the over-issue of incontrovertible paper currencies, and this is still an expedient adopted under the pressure of difficulties.

The discussion of matters relating to currency, and the increased intercourse among the more advanced nations, have led to the raising of some questions with regard to the proper constitution of monetary systems. Each country possessing any claim to enlightenment has directed its attention to its own monetary arrangements, and compared them with those of others, while the effect which the currency system of any nation exercises on its neighbors leads to the exciting of a lively interest in its monetary legislation. The principal problems may be summed up under three heads: (1) The proper standard to use, the discussion of which in practice turns on the comparative merits of a single standard of gold or silver and of a double standard of gold and silver at a fixed ratio; (2) the system of subdividing the currency, which is generally discussed under the title of proposals for decimal coinage; (3) proposals made in many quarters to assimilate the various currency systems of the world. These take one of two forms. It is either desired that a group of nations shall assimilate their currencies, in which case the coinage may be called an international one; or a wider view is taken, and a single system is advocated for all states. This may be styled universal

coinage. Every currency system must be based on a *standard unit of value* which consists of a "fixed quantity of some concrete substance defined by reference to the units of weight or space." Thus the English unit is the *pound*, which consists of a definite quantity of gold (123.27447 grains standard fineness), while the French unit is the *franc* (composed of five grammes of silver nine-tenths fine). It is not, however, necessary that the standard unit shall be a coin. All that is needful is that the current coins shall be multiples or sub-multiples of the unit, or at all events easily reducible to it.

Another distinction must be pointed out, namely, that between *standard* and *token* money, the former being of the same value as the metal it is made of, while the latter is rated at a nominal value higher than that of its material. The silver and copper coins in England and the smaller silver coins in the Latin Union are merely tokens, being, in the case of the English silver coins, about 30 per cent. below their nominal value. The French coins are of inferior fineness (835 per 1000). Token coins are only admissible in small payments, as otherwise—in accordance with an elementary principle to be presently explained—the standard coins would be driven out of circulation. The maximum amount in payment for which they are legal tender is in England 40 shillings, or \$10. One of the functions of money being to afford a standard for estimating deferred payments, it is generally used as the means of discharging obligations when they become due, and in this aspect is styled *legal tender*. The principal coinage of any country is legal tender to an unlimited amount, and, when offered, discharges any pecuniary obligation. It is only the standard coinage which possesses this property, or rather the standard coinage is that which does possess it.

In discussing monetary questions it is also important to remember that a metallic currency has to circulate among the most diverse classes of society, and must be suited to the wants, and even to the prejudices, of the population using it. The great mass of a population, it is true, take and give money without particularly observing it. It is enough if the coin conforms to the usual type. There exists, however, in all mercantile communities a class of dealers in money who make a profit by selecting the best coins for exportation, or, if two metals are in concurrent use, the coins of that metal which is undervalued in the proportion fixed. The mode in which self-interest thus operates produces an effect which may be briefly formulated by saying that *bad money drives out good money*. It is often now called "Gresham's law," from a former minister of the English mint, who observed it.

The simplest form of currency seems to be that in which the state coins ingots of different metals, and allows them to circulate freely, without any ratio being fixed. This, which is the lowest form of currency proper, has arisen in many countries through the introduction of coins of various other nations. Turkey is a European example. Many of the South American republics possess a currency of this description. A theoretical form of this system has been advocated in France. It is proposed to issue coins of one, two, five and ten grammes of gold, and to allow the present silver coins which are multiples of the gramme to circulate along with them. The difficulties of this plan are so obvious that there is no likelihood of its being adopted. The arguments in its favor are of little force, since it is hardly correct to contend that it is a natural system, when it has never been willingly adopted by any country. The next system to be noticed is that of a single metal being fixed as legal tender. This in early times is the really natural arrangement, and has been

widely adopted. It is needless to recapitulate the instances which have already been given in dealing with other matters. There is, however, a difficulty which soon arises under this system. If the metal chosen is not very valuable, it is too cumbrous for large payments; if, on the other hand, it possesses a high value, it is hard to coin pieces suitable for small transactions. Thus, even silver would be too bulky for such payments as frequently occur. \$500 in silver at its present value would weigh over forty pounds, while it would be impossible to coin gold pieces of the value of a cent or even a dime. This system thus naturally leads to the use of other metals besides the standard one, and when the state fixes the ratio between these metals a new system has come into existence, which has been called the *multiple tender* system. In it the ratios between the metals are fixed, either once for all, or until changed by state authority. The fluctuation of currencies arranged on this method, owing to the action of Gresham's law, has led in England and Germany to a modified system, which seeks to combine any advantages of the multiple standard with the principle of the single standard. By this method one metal is fixed as the principle legal tender, while the smaller coins are made of a less valuable material, and circulated at a nominal value somewhat above their real one, or, in other words, as token coins, but they are only legal tender to a limited amount. This has been called the *composite legal tender* system.

Only three systems of standard money need be here examined, namely, the *single* standard system, the *multiple* standard system, and, lastly, the *composite* system. Nor even is there any need for examining the various possible single or multiple standards. The single silver standard is the only one of the former, as the double gold and silver standard is the only one of the latter, which need be taken into account. The advance of gold to a position parallel to silver was commenced in the thirteenth and continued in the fourteenth century, the method of regulating the mixed gold and silver currencies being by proclamation, which fixed the varying ratios from time to time. In England this course was followed from the first introduction of gold coins (1257) to 1663. From 1663 to 1717 silver was the standard, and the gold coins passed at their market value. As the silver coins were very much debased, the gold guinea sometimes was deemed equivalent to 30s. After the recoinage of 1696 the guinea passed at 21s. 6d. At this ratio silver was underrated, and was accordingly exported to Continental Europe and to India. The loss of the silver coins aroused the public attention, and the matter was submitted to Sir I. Newton, whose answer was given in his *Third Representation*. He proposed to reduce the guinea from 21s. 6d. to 21s. as an experimental measure. The proper reduction for the object in view would have been to 20s. 8d. The silver drain, therefore, continued, and England came to have a gold currency. An opposite arrangement gave France a silver coinage. The recent facts of French monetary history, as well as those of the United States, illustrate the same condition of affairs. The difficulty of constituting a double standard system on a secure basis is thus made clear, so far at least as regards a single country. For the continuance of the two metals in the currency depends on the market ratio and the legal ratio between gold and silver being the same. The slightest examination of the history of these metals will show how variable they have been. Without accepting the estimates which regard silver as being more valuable than gold, the well-attested variations of the precious metals have been very considerable. Thus, Herodotus estimates the

ratio as one to thirteen, Plato one to twelve, Menander one to ten, and in Cæsar's time the ratio was one to nine.

In the fourteenth century the value of gold rose remarkably, and the gradual movement has ever since been toward an appreciation of gold relatively to silver. Another point, previously noticed, is the tendency, as wealth increases, to adopt a more valuable form of currency. Greece, Rome, and England all afford illustrations of this movement. The experience of the evils of a mixed currency led the earlier writers on coinage in England to regard a single standard system as the best, and silver as the most suitable metal for the standard. Locke, Petty, and Harris all advocated this view. The earlier Italian writers proposed to combine gold and silver at a ratio of one to twelve, which they conceived to be the actual proportion. The theory of a composite system was as before mentioned, first given by Lord Liverpool. This method of regulating the metallic currency was established in England, as it were, accidentally, and deliberately adopted only in 1816. The practical good results which followed made all English economists of that period warm advocates of the composite system. Thus, M'Culloch and Tooke agree in supporting the English system, as also does J. S. Mill. On the Continent the weight of authority was more divided, and the existence of the French bimetallic system gave support to the advocates of a double standard. The result of the gold discoveries in Australia and California was to greatly increase the supply of that metal, and, under the action of Gresham's law, to change the French currency from silver to gold, while Holland, to avoid the evils which were anticipated from the reduced value of that metal, adopted silver as the standard. The movements in favor of a universal currency described above, combined with the course of events, brought the standard question into greater prominence. The proposal of the Paris conference of 1867, for a single gold standard, and a universal coinage on that basis, raised the question to great prominence. Wolowski and Courcelle Seneuil strongly opposed the recommendation, the former predicting that a disastrous appreciation of gold would follow. This view seems borne out by the result, for, although a universal coinage was not created, yet Germany and the Scandinavian Union both changed from a silver to a gold standard, while Holland and the United States both made movements in the same direction by demonetizing silver and making preparations for adopting gold. The Latin Union at the same time restricted their silver coinage, which had nearly the same effect as the adoption of a gold standard. The result of these extensive changes was to cause much confusion. The more ardent advocates of a double standard, too, attributed most of the continued trade depression to this cause. The altered condition of opinion on the question was seen at the monetary conference held at Paris in 1878, where the universal demonetization of silver was considered to be dangerous. The "Bland Act" of the United States, which theoretically decreed the double standard (1878), was another instance of reaction. The great depreciation of silver, which resulted mainly from its having ceased to be money over a large part of the civilized world, severely affected the Indian finances, and thus the advocates of a double standard were able to command some attention in England. The conference held in Paris in 1881 reflected these changed views. The supporters of the double standard took the initiative and proposed a treaty based on the double standard at a fixed ratio, but no conclusion was arrived at—England, Germany, and the Scandinavian Union upholding the gold standard.

MONFERRATO, or MONTFERRAT, an ancient marquisate of North Italy, in the valley of the Tanaro, the name of which still survives in the fuller title (Casale Monferrato) of the town of Casale. The princes of Monferrato were among the most powerful Italian families of the Middle Ages.

MONGE, GASPARD, a French mathematician, the inventor of descriptive geometry, was born at Beaune on May 10, 1746.

In 1768 Monge became professor of mathematics, and in 1771 professor of physics, at Mézières; in 1778 he married Madame Horbon, a young widow whom he had previously defended in a very spirited manner from an unfounded charge; in 1780 he was appointed to a chair of hydraulics at the Lyceum in Paris (held by him together with his appointments at Mézières), and was received as a member of the Academy; his intimate friendship with Berthollet began at this time. In 1783, quitting Mézières, he was, on the death of Bezout, appointed examiner of naval candidates.

Monge contributed (1770-1790) to the *Memoirs* of the Academy of Turin, the *Mémoires des Savants Étrangers* of the Academy of Paris, the *Mémoires* of the same Academy, and the *Annales de Chimie*, various mathematical and physical papers.

In 1792, on the creation by the Legislative Assembly of an executive council, Monge accepted the office of minister of the marine, but retained it only until April, 1793. When the Committee of Public Safety made an appeal to the savants to assist in producing the *matériel* required for the defense of the republic, he applied himself wholly to these operations, and distinguished himself by his indefatigable activity therein; he wrote at this time his *Description de l'art de fabriquer les canons*, and his *Avis aux ouvriers en fer sur la fabrication de l'acier*. He took a very active part in the measures for the establishment of the Normal School (which existed only during the first four months of the year 1795), and of the School for Public Works, afterward the Polytechnic School, and was at each of them professor for descriptive geometry; his methods in that science were first published in the form in which the shorthand writers took down his lessons given at the Normal School in 1795, and again in 1798-99. In 1796 Monge was sent into Italy with Berthollet and some artists to receive the pictures and statues levied from several Italian towns, and made there the acquaintance of General Bonaparte. Monge was appointed president of the Egyptian commission, and resumed his connection with the Polytechnic School. His later mathematical papers are published (1794-1816) in the *Journal* and the *Correspondance* of the Polytechnic School. On the formation of the Senate he was appointed a member of that body, with an ample provision and the title of count of Pelusium; but on the fall of Napoleon he was deprived of all his honors, and even excluded from the list of members of the reconstituted Institute. He died at Paris on July 28, 1818.

MONGHYR, or MUNGIR, a district in the lieutenant-governorship of Bengal, with an area of 3,922 square miles. The Ganges divides the district into two portions. The northern, intersected by the Burí, Gandak, and Tiljugá, two important tributaries of the Ganges, is always liable to inundation during the rainy season, and is a rich, flat, wheat and rice country, supporting a large population. The population of Monghyr is 1,812,986.

MONGHYR, chief town and administrative headquarters of the above district, is situated on the south bank of the Ganges. The population is 59,698.

MONGOLS. The early history of the Mongols, like that of all central-Asian tribes, is extremely obscure. Even the meaning of the name "Mongol" is a disputed

point, though a general consent is now given to Schott's etymology of the word from "mong," meaning brave. From the earliest and very scanty notice we have of the Mongols in the history of the T'ang dynasty of China (A.D. 619-90) and in works of later times, it appears that their original camping-grounds were along the courses of the Kerulon, Upper Nonni, and Argun rivers. But in the absence of all historical particulars of their origin, legend, as is usual, has been busy with their early years. The soberest story on record is that their ancestor Budantsar was miraculously conceived of a Mongol widow. By craft and violence Budantsar gained the chieftainship over a tribe living in the neighborhood of his mother's tent, and thus left a heritage to his son. Varying fortunes attended the descendants of Budantsar, but on the whole their power gradually increased, until Yesukai, the father of Jenghiz Khan, who was eighth in descent from Budantsar, made his authority felt over a considerable area. How this dominion was extended under the rule of Jenghiz Khan has already been shown (see JENGHIZ KHAN), and when that great conqueror was laid to rest in the valley of Keleen in 1227 he left to his sons an empire which stretched from the China Sea to the banks of the Dnieper.

In 1235, Ogdai, whose troops were as numerous as their thirst for conquest was devouring, dispatched three armies in as many directions. One was directed against Corea, one against the Sung dynasty, which ruled over the provinces of China south of the Yang-tsze-Keang, and the third was sent westward into eastern Europe. With irresistible vigor and astonishing speed the Mongols made their way through the forests of Penza and Riazan. For five days they discharged a ceaseless storm of shot from their balistas, and having made a breach in the defenses, carried the city by assault on December 21, 1237. Moscow, at this time a place of little importance, next fell into the hands of the invaders, who then advanced against Vladimir. After having held out for several days against the Mongol attacks, the city at length succumbed, and the horrors of Riazan were repeated. The imperial family, with a vast crowd of fugitives, sought shelter in the cathedral, only to perish by the swords of the conquerors or by the flames which reduced it to ashes.

Victorious and always advancing, the Mongols, having desolated this portion of Russia, moved on in two divisions, one under Batu into Hungary, and the other under Baidar and Kaidu into Poland. Without a check, Batu marched to the neighborhood of Pesh, where the whole force of the kingdom was arrayed to resist him. While the careless Hungarians were sleeping he launched his battalions into their midst. Panic-stricken and helpless, they fled in all directions, followed by their merciless foes. Two archbishops, three bishops, and many of the nobility were among the slain, and the roads for two days' journey from the field of battle were strewn with corpses. Meanwhile Batu captured Pesh, and on Christmas day, 1241, the ruling monarch having crossed the Danube on the ice, took Gran by assault. While Batu had been thus triumphing, the force under Baidar and Kaidu had carried fire and sword into Poland. At their approach the inhabitants of Cracow deserted the city, after having given it over to the flames. Disappointed at the loss of their expected spoil, the Mongols advanced to Wahlstatt in the neighborhood of Liegnitz, where the Polish army under Duke Henry II. of Silesia awaited their onslaught. With savage impetuosity, the troops of Baidar rushed to the attack, and completely defeated the Poles.

While his lieutenants had been thus carrying his arms in all directions, Ogdai had been giving himself up to

ignoble ease and licentiousness. Like many Mongols, he was much given to drink, and it was to a disease produced by this cause that he finally succumbed, on December 11, 1241. He was succeeded by his son Kuyuk, who reigned only seven years.

On July 1, 1251, Mangu, the eldest son of Tulé and nephew to Ogdai, was elected khakan. With perfect impartiality, Mangu allowed the light of his countenance to fall upon the Christians, Mohammedans, and Buddhists among his subjects, although Shamanism was recognized as the state religion. On his accession complaints reached Mangu that dissensions had broken out in the province of Persia, and he therefore sent a force under the command of his brother Hulagu to punish the Ismailites or Assassins, who were held to be the cause of the disorder. Marching by Samarkand and Kesh, Hulagu crossed the Oxus and advanced by way of Balkh into the province of Kohistan. Hulagu then marched across the snowy mountains in the direction of Baghdad. On arriving before the town he demanded its surrender. This being refused, he laid siege to the walls in the usual destructive Mongol fashion, and at length, finding resistance hopeless, the caliph was induced to give himself up and to open the gates to his enemies. On February 15, 1263, the Mongols entered the walls, and, following their instincts, sacked the city. For several days it was given up to pillage, fire, and the sword, and the number of killed was said to have reached the enormous sum of 800,000. For the moment the caliph's life was spared, and he was allowed to carry away 100 wives out of 700 who lived in his harem. But his fate soon overtook him. Accounts differ as to the circumstances of his death, some saying that he was sewn up in a sack and trodden to death by horses, others that he was starved to death. To the Moslem world his loss was a religious catastrophe, as by it Islam lost its spiritual head. One terrible result of the Mongol invasion was a fearful famine, which desolated the provinces of Irak-Arabi, Mesopotamia, Syria, and Rûm. But, though the inhabitants starved, the Mongols had strength and energy left to continue their onward march into Syria. Aleppo was stormed and sacked, Damascus surrendered, and Hulagu was meditating the capture of Jerusalem with the object of restoring it to the Christians when he received the news of Mangu's death, and, as in duty bound, at once set out on his return to Mongolia, leaving Kitubuka in command of the Mongol forces in Syria. As a reward for his services, Hulagu received the investiture of his conquests, and established there the empire of the Ilkhans.

While Hulagu was prosecuting these conquests in western Asia, Mangu and his next brother Kublai were pursuing a like course in southern China. Southward they even advanced into Tong-king, and westward they carried their arms over the frontier into Tibet.

At the Kuriltai, or assembly of notables, which was held at Shang-tu after the death of Mangu, his brother Kublai (see KUBLAI KHAN) was elected khakan. For thirty-five years he sat on the Mongol throne, and at his death in 1294, in his seventy-ninth year, he was succeeded by his son Timur Khan, or, as he was otherwise called, Uldsheitu Khan. Uldsheitu was succeeded by his nephew Khaissan, known as Kuluk Khan. After a short reign, and at the early age of thirty-one, Kuluk was gathered to his fathers in February, 1311. His nephew and successor, Buyantu, was a man of considerable culture, and substantially patronized Chinese literature. After a reign of nine years Buyantu was succeeded by his son Gegen, who perished in 1323 by the knife of an assassin—the first occasion on which a reigning descendant of Jenghiz Khan thus met his fate.

Yissun Timur, who was the next sovereign, devoted himself mainly to the administration of his empire. He divided China, which until that time had been apportioned into twelve provinces, into eighteen provinces, and rearranged the system of state granaries, which had fallen into disorder.

The following years were years of great natural and political convulsions. Devastating floods swept over China, carrying death and ruin to thousands of homes; earthquakes made desolate whole districts; and in more than one part of the empire the banners of revolt were unfurled. The khakans who now successively occupied the throne, instead of striving to stem the tide of discontent and disorder, gave themselves up to every kind of debauchery. As a natural consequence, the conduct of affairs fell entirely into the hands of their ministers, who but too often reflected the vices of their sovereigns.

In 1355 a Buddhist priest named Choo Yuen-chang became so impressed with the misery of his countrymen that he threw off his vestments and enrolled himself in the rebel army. His military genius soon raised him to the position of a leader, and with extraordinary success he overcame, with his rude levies, the trained legions of the Mongol emperor. For a time the western provinces of China continued to hold out against the rebels, but with the flight of Toghon Timur the Mongol troops lost heart, and in 1368 the ex-Buddhist priest ascended the throne as the first sovereign of the Ming or "Bright" dynasty, under the title of Hung-woo.

Thus ended the sovereignty of the house of Jenghiz Khan in China. Not content with having recovered China, the emperor Hung-woo sent an army of 400,000 men into Mongolia in pursuit of the forces which yet remained to the khakan. Even on their own ground the disheartened Mongols failed in their resistance to the Chinese, and at all points suffered disaster. Meanwhile Toghon Timur, who did not long survive his defeat, was succeeded in the khakanate by Biliktu Khan, who again in 1379 was followed by Ussakhal Khan. During the reign of this last prince, the Chinese again invaded Mongolia, and inflicted a crushing defeat on the khan's forces in the neighborhood of Lake Buyur.

The Mongol royal family and their immediate surroundings occupied the Chakhar country to the northwest of the Ordus territory, where they became eventually subjugated by the Manchus on the overthrow of the Ming dynasty in 1644 by the present rulers of China.

But while China was thus overcoming the Mongols within her reach, Russia was gathering within her borders those with whom she came into contact. Among these were the Buriats, who occupied a large territory on both sides of the Baikal Lake. As usual in such cases, disputes arose out of disturbances on the frontier, and were ended by the Buriats and the neighboring Mongol tribes becoming one and all tributary to Russia. Of the Mongol tribes who became entirely subject to Russia the principal are those of the Crimea, of Kasan, and of Astrakhan; of these the Tatars of Kasan are the truest representatives of the Golden Horde or Kipchaks, who originally formed the subjects of Batu and Orda. Batu, whose victorious campaign in Russia has already been sketched, was finally awarded as his fief the vast steppes which stretch from the Carpathian Mountains to the Balkash Lake. Over these vast plains the Mongols followed their flocks and herds, while the more settled among them established themselves along the banks of the rivers which flow through that region. Batu himself fixed his headquarters on the Volga, and there set up his Golden

Tent from which the horde acquired the name of the Golden Horde. In 1255 Batu died and was succeeded by his brother Bereke Khan. During the reign of this sovereign the exactions which were demanded from the Russian Christians by the Mongols aroused the Christian world against the barbarian conquerors, and at the command of Pope Alexander IV. a general crusade was preached against them. But though the rage of the Christians was great, they lacked that united energy which might have availed them against their enemies; and, while they were yet breathing out denunciations, a Tartar host, led by Nogai and Tulabagha, appeared in Poland. After a rapid and triumphant march, the invaders took and destroyed Cracow, and from thence advanced as far as Bythom in Oppeln, from which point they eventually retired, carrying with them a crowd of Christian slaves. From this time the Mongols became for a season an important factor in European politics. They corresponded and treated with the European sovereigns, and intermarried with royal families.

The adoption of Islam by the rulers of the Golden Horde had as one result the drawing closer of the relations of the Mongols with Constantinople and Egypt. Embassies passed between the three courts, and so important was the alliance with the Mongols deemed by the sultan Násir, ruler of Egypt, that he sent to demand in marriage a princess of the house of Jenghiz Khan. At first his request was refused by the proud Mongols; but the present of a million gold dinars, besides a number of horses and suits of armor, changed the refusal into an acquiescence, and in October, 1319, the princess landed at Alexandria in regal state. With all their love of war the Mongols had a keen eye to monetary advantage, and Janibeg, who was no exception to the rule, concluded treaties with the merchant-princes of Venice and Genoa, in which the minute acquaintance displayed with shipping dues and customs charges shows how great were the advances the Mongols had made in their knowledge of European commerce since the days of Jenghiz Khan. The throne Janibeg had seized by violence was, in 1357, snatched from him by violence.

But while the power of the Golden Horde was dwindling away, the White Horde or Eastern Kipchak, which was the inheritance of the elder branch of the family of Juchi, remained prosperous and full of vitality. The descendants of Orda, Batu's elder brother, being far removed from the dangerous influence of European courts, maintained much of the simplicity and vigor of their nomad ancestors, and the throne descended from father to son with undiminished authority until the reign of Urus Khan (1360), when complications arose which changed the fortunes of the tribe. Like many other opponents of Mongol rulers, Khan Tuli Khoja paid with his life for his temerity in opposing the political schemes of his connection Urus Khan. Toktamish, the son of the murdered man, fled at the news of his father's death and sought refuge at the court of the famous Timur-i-leng (Tamerlane), who received him with honor and at once agreed to espouse his cause.

Toktamish now seized the throne, not only of Eastern Kipchak but also of the Golden Horde, over which his arms had at the same time proved victorious. His demands for tribute from the Russian princes met with evasions from men who had grown accustomed to the diminished power of the later rulers of the Golden Horde, and Toktamish therefore at once marched an army into Russia. Having captured Serpukhoff, he advanced on Moscow. On August 23, 1382, his troops appeared before the doomed city. For some days the inhabitants bravely withstood the constant attacks on

the walls, but failed in their resistance to the stratagems which were so common a phase in Mongolian warfare. Without discriminating age or sex, the Mongol troops butchered the wretched inhabitants without mercy, and, having made the streets desolate and the houses tenantless, they first plundered the city and then gave it over to the flames. The same pitiless fate overtook Vladimir, Zvenigorod, Yurieff, Mozhaïsk, and Dimitroff. - In 1395 Timur found it necessary again to undertake a campaign against Toktamish. This time the armies met upon the Terek, and after a fiercely-contested battle the Kipchaks again fled in confusion. The pursuit along the Volga was vigorously undertaken, and the slaughter among the fugitives was terrible. The hurried advance of Timur's horsemen threw the Russians into a state of wild alarm, and the grand-prince of Moscow ordered that an ancient image of the Virgin which was believed to possess miraculous power should be taken to Moscow to save that city from the destroyer. Success appeared to attend this measure, for Timur, threatened by the advancing autumn, gave up all further pursuit, and retired with booty. On his homeward march southward he arrived before Azak, which was then the entrepôt where the merchants of the east and west exchanged their wares. In vain the natives, with the Egyptian, Venetian, Genoese, Catalan, and Basque inhabitants, besought him to spare the city. His answer was a command to the Moslems to separate themselves from the rest of the people, whom he put to the sword, and then gave the city over to the flames. Circassia and Georgia next felt his iron heel, and the fastnesses of the central Caucasus were one and all destroyed. One solitary fragment of the Golden Horde, the khanate of Astrakhan, maintained for a time an existence after the fall of the central power. But even this last remnant ceased to be a Mongol appanage in 1554, when it was captured by the Russians and converted into a Russian province. The fate which thus overtook the Golden Horde was destined to be shared by all the western branches of the great Mongol family. The khans of Kasan and Kasimoff had already in 1552 succumbed to the growing power of Russia, and the Krim Tartars were next to fall under the same yoke.

MONGOOS, or MUNGOOS. See ICHNEUMON.

MONITION, in the practice of the English ecclesiastical courts, is an order requiring or admonishing the person complained of to do something specified in the monition, "under pain of the law and penalty thereof." It is the lightest form of ecclesiastical censure, but disobedience to it, after it has been duly and regularly served, entails the penalties of contempt of court.

MONK, GEORGE, English general, was born in Devonshire, December 6, 1608. An exploit which brought him within the reach of the law compelled him to begin his career as a soldier of fortune at the age of seventeen. He acted under Sir R. Grenville as a volunteer in the expedition to Cadiz, and the next year did notable service at the Isle of Rhé. In 1629 Monk went to the Low Countries, the training ground for military men, where in Oxford's and in Goring's regiments he obtained a high reputation for courage. In 1638 he threw up his commission in consequence of a quarrel with the Dutch civil authorities, returned to England, and obtained the lieutenant-colonelcy of Newport's regiment during the operations on the Scottish border. Here he showed his skill and coolness in the dispositions by which he saved the English artillery at Newborn, though himself destitute of ammunition; and in the councils of war he confidently voted with Strafford for fighting, and against retreat or composition. The Irish rebellion now called for his service, and in February, 1641, he landed at Dublin

as colonel of Lord Leicester's regiment. Here he greatly increased his reputation. The governorship of Dublin was vacant, and Monk was appointed by Leicester. But Charles I. overruled the appointment in favor of Lord Lambert. Monk now deemed it safest to affect Royalist views. His value caused him to be received at once into Charles' confidence; he was appointed major-general of the Irish brigade, and served under Byron at the siege of Nantwich. Here he was taken prisoner by Fairfax, on January 25, 1644. After a short captivity in Hull he was placed in the Tower, where he remained for three years (during which his father died,) beguiling his imprisonment by writing his *Observations on Military and Political Affairs*.

So long as the war lasted Monk could not be released. Charles, however, became a prisoner; the troubles in Ireland made the parliament anxious to secure Monk's services, and he was told that if he would take the Covenant he might have an important command. With some show of hesitation the terms were accepted, and, after a service of two months in Lord Lisle's abortive expedition, Monk was placed in command of the British forces in the north of Ireland. Compelled in 1649 to conclude a pacification with the rebel O'Neill, he returned to England after the king's execution. In the same year he succeeded, by his elder brother's death, to the family estate. His idleness lasted but a short while. Cromwell gave him a regiment and the command of the ordnance in the Scotch war of 1650, and after the battle of Dunbar, in which he led the attack, he was left with 6,000 men to subdue the country, which, after taking Edinburgh, Tantallon, and Stirling castles, he did most completely in a few weeks. In 1653, with Admiral Dean, he commanded the British fleet against the Dutch, and on June 2d and 3d and July 29th fought two of the most sanguinary naval battles on record, in which both his colleague and Van Tromp were slain. A peace on very humiliating terms to the Dutch was concluded, but policy shortly led Cromwell to allow milder conditions—a concession against which Monk strongly remonstrated. On his return he married his mistress, Anne Clarges, a woman of the lowest extraction. Monk was now sent to quell the revolt headed by Middleton in Scotland, and, when this service was over, settled down to a steady government of the country for the next five years. For fanaticism in any shape he had no sympathy, and he set himself to diminish the influence of the Presbyterian clergy—Cromwell's chief opponents—taking from them the power of excommunication and their general assemblies, but allowing them to retain their presbyteries. Equal repression was exercised against the nobility and gentry. The timely discovery of a plot fomented by Overton for killing Monk on New Year's Day gave him an excuse for thoroughly purging his army of all Anabaptists, Fifth Monarchy men, and other dangerous enthusiasts. It is doubtful whether at this time Monk had proposed to himself the restoration of the king. He probably had it always in his mind as a possibility, but he would run no risks. His very reticence, however, caused alarm on one side and hope on the other.

During the confusion which followed Cromwell's death Monk remained silent and watchful at Edinburgh, careful only to secure his hold on his troops. In July, 1659, direct and tempting proposals were made to him by the king. His brother, Nicholas, a clergyman, was employed by Sir J. Grenvil to bring to him the substance of Charles' letter. No bribe, however, could induce him to act one moment before the right time. On October 17th, he heard of Lambert's *coup d'état*. From that moment his plan of action seems to have been settled. In most vehement language he discarded

the idea of restoring Charles, and with admirable perception of the state of English feeling took for his principles that in all cases the army must obey the civil government, and that the civil government must be parliamentary. At present the Rump was crushed by the military party; the first thing, therefore, to be done was to free it. His army underwent a second purging of disaffection, and he then issued a declaration embodying the principles mentioned above, and wrote to Lenthall the speaker, and to the military party to the same effect. In a treaty with the Committee of Safety his commissioners, who were to treat only on the basis of the restoration of parliament, were outwitted. Monk at once refused to accept the terms proposed, and march to Berwick, having received an offer from Fairfax of assistance if he would promise that the secluded members should be restored. Meanwhile Lambert had marched northward to oppose his advance.

Monk's action gave fresh heart to the adherents of the parliament. The old council of state met, and named him general of all the forces; the fleet and the Irish army, hitherto hostile, came round to his side, and so did Whetham at Portsmouth. Monk now, in the depth of winter, crossed the Tweed at Coldstream and marched by Morpeth to Newcastle. On his approach Lambert's army fell away from their general, and no obstacle remained on the path to London. At York, when urged by Fairfax, he refused to declare for the king, and is said to have caned an officer who affirmed that such was his design. The parliament now ordered him to come to London. Fleetwood's army which occupied the city, was, however, a great obstacle; and it was not until the parliament, in accordance with his desire, had arranged for its dispersion that he would enter with his troops. Even now his intentions were strictly concealed; the spies set upon him by the various anxious parties were baffled by his impenetrable reserve. He was careful to appear only as the servant of parliament, but when he was desired to take the oath of abjuration he skillfully evaded the request. The city, always jealous of the Rump, now refused to pay taxes except at the orders of a free parliament. Monk, in consequence, was ordered to march his troops into the city, take down the chains and posts, and unhinge the gates. He obeyed these unpleasant orders to the letter on February 10th, thus permitting the hatred against the Rump to rise to its height, while he showed how unwilling an instrument of its will he was. On the eleventh, however, he threw off the mask, and wrote to the Rump, peremptorily ordering them to admit the secluded members, and to arrange for the dissolution of parliament by May 6th. On February 21st, he conducted the secluded members to their seats. At the same time he refused to restore the Lords, and issued an order disowning Charles Stuart to all officers commanding garrisons. Every day brought him fresh opportunities for tact or evasion. His partisans urged him to take the protectorate himself; another party pressed upon him to accomplish the restoration by the army alone; a body of his officers sent him a declaration expressing their fears that his action would lead to the restoration of monarchy; the parliament tried to make him their own by the offer of Hampton Court. His trained habits of dissimulation and evasion, assisted now and again by downright lying, carried him triumphantly through all these dangers, and at length the dissolution of parliament on March 17th, removed his greatest difficulties.

It was now that, with the utmost secrecy, he gave an interview for the first time to the king's agent Grenvil, and by him sent to Charles the conditions of his restor-

ation, afterward embodied in the Declaration of Breda. For himself at present he would accept nothing but a royal commission as captain-general, which he carefully kept to himself. All parties were anxious to gain the credit of the now certain restoration. The Presbyterians in particular, fearful of the king being restored without terms, did their best to discredit Monk and to impose the old Isle of Wight conditions; but in vain. The new parliament was elected, and the House of Lords restored; an insurrection by Lambert, who had escaped from the Tower, was quelled by Monk's prompt measures, and on April 25th he received the solemn thanks of both Houses, and the title of captain-general of the land forces. Even yet the farce was kept up. Monk received with feigned surprise the king's official letter from Grenvil, denied all knowledge of its contents, and handed it over sealed to the council, who decided to defer opening it until the meeting of parliament on May 1st.

With the Restoration the historic interest of Monk's career ceases. The rude soldier of fortune had played the game with incomparable dexterity, and had won the stakes. He was made gentleman of the bedchamber, knight of the Garter, master of the horse, commander-in-chief, and duke of Albemarle, and had a pension of £7,000 a year allotted him. His utmost desires were satisfied, and he made no attempt to compete further in a society in which neither he nor his vulgar wife could ever be at home, and which he heartily despised. As long as the army existed of which he was the idol, and of which the last service was to suppress Venner's revolt, he was a person not to be displeased. But he entirely concurred in the measure for disbanding it, and thenceforward his influence was small, though men's eyes turned naturally to him in emergency. In the trial of the regicides he was on the side of moderation, and his interposition saved Hazelrig's life; but his action at the time of Argyll's trial will always be regarded as the most dishonorable episode in his career. In 1664 he had charge of the admiralty when James was in command of the fleet, and when in 1665 London was deserted on account of the plague, Monk, with all the readiness of a man accustomed to obey without thinking of risk, remained in charge of the government of the city. Once more, at the end of this year, he was called upon to fight, having a joint commission with Prince Rupert against the Dutch. The whole burden of the preparations fell upon him. On April 23, 1666, the admirals joined the fleet and on June 1st began a battle near Dunkirk which lasted four days, followed by another on July 23d, in which Monk showed all his old coolness and skill, and a reckless daring which had seemed hitherto foreign to his character. His last service was in 1667, when the Dutch fleet sailed up the Thames, and Monk, ill as he was, hastened to Chatham to oppose their further progress. From that time he lived much in privacy, and died of dropsy on December 3, 1669.

MONKEY. See APE.

MONMOUTH, a maritime county of England, is bounded east by Gloucester, northeast by Hereford, northwest by Brecknock, west and southwest by Glamorgan, and south by the Bristol Channel. Its greatest length from north to south is about thirty-five miles, and its greatest breadth about twenty-eight miles. The area is 368,399 acres, or about 572 square miles.

MONMOUTH, a parliamentary and municipal borough of England, and the county town of Monmouthshire, is picturesquely situated at the confluence of the Wye and Monnow, in a valley almost surrounded by hills, 18 miles south of Hereford, and 128 west of London. Population (1890), 6,500.

MONMOUTH, a small manufacturing city in Warren county, Ill., 180 miles southwest of Chicago. Population (1890), 5,837.

MONMOUTH, JAMES, DUKE OF, was the son of Lucy Walters, "a brown, beautiful, bold, but insipid creature," who became the mistress of Charles II. during his exile at the Hague. He was born at Rotterdam, April 9, 1649. That Charles was his father is more than doubtful, for Lucy Walters had previously lived with Robert Sidney, brother of Algernon, and the boy resembled him very closely. No formal acknowledgment of his relation to the king was made until his betrothal to Anne Scott, daughter of the earl of Buccleuch, and the wealthiest heiress of Scotland, whom he married in 1665. During 1663 he was made duke of Orkney, duke of Monmouth, and knight of the Garter, and received honorary degrees at both universities. At court he was treated as a prince of the blood. Soon after 1670 the anti-popery spirit became a frenzy, and the succession of James a probability and a terror. Charles was urged to legitimize Monmouth by a declaration of his marriage with Lucy Walters. He returned answer that, much as he loved the duke, he would rather see him hanged at Tyburn than own him for his legitimate son. Every attempt, however, was henceforth made, especially by Shaftesbury, to accustom people to this idea. He was taught to regard himself as the representative of the Protestant interest, and his position was emphasized by James' second marriage with the Roman Catholic princess Mary of Modena. From this time his popular title was "the Protestant duke." Charles was induced to confer many prominent employments upon him. The influence of James, however, was strong enough to prevent his obtaining the lord-lieutenancy of Ireland; but he received the command of the 6,000 troops who assisted the French in the second Dutch war, and, though without any claims to generalship, behaved with courage in the field. In 1674 he was made "commander-in-chief;" and, in connection with this, another unsuccessful attempt, graphically described in Clarke's *Life of James*, was made to gain from Charles a tacit admission of his legitimacy. At Shaftesbury's instance he was placed in command of the army employed in 1675 against the Scottish Covenanters, and was present at Bothwell Bridge (June 22, 1679). He was also, at the king's request, elected chancellor of the university of Cambridge. In 1678, when Charles was driven into war with Louis, Monmouth took the command of the English contingent, and again gained credit for personal courage at the battle of St. Denis. On his return to London England was in the throes of the popish terror. The idea of securing the Protestant succession by legitimizing Monmouth again took shape, and was eagerly pressed on by Shaftesbury; at the time it seemed possible that success would wait on the audacity.

James retired to Brussels, the king having previously signed a declaration that he "never was married, nor gave contract to any woman whatsoever but to my wife, Queen Catherine." In spite of this, Monmouth might naturally now nourish ambitious views. His rival was off the stage; Shaftesbury, his chief supporter, was president of the remodeled privy council; and he himself was the favorite of the city. In the summer of 1679 the king suddenly fell ill, and the dangers of a disputed succession became terribly apparent. The party opposed to Monmouth, or rather to Shaftesbury, easily prevailed upon Charles to consent to his brother's temporary return. When, after the king's recovery, James went back to Brussels, he received a promise that Monmouth too should be removed from favor and ordered to leave the country. Accordingly, in September, 1679,

the latter repaired to Utrecht, while shortly afterward James' friends so far gained ground as to obtain for him permission to reside at Edinburgh instead of at Brussels. Within two months of his arrival at Utrecht, Monmouth secretly returned to England, arriving in London on November 27th. Shaftesbury had assiduously kept alive the anti-popery agitation, and Monmouth, as the champion of Protestantism, was received with every sign of popular delight. The king appeared to be greatly incensed, deprived him of all his offices, and ordered him to leave the kingdom at once. This he refused to do, and the only notice taken of the disobedience was that Charles forbade him to appear at court.

It is probable that Monmouth never went so far as to think of armed rebellion; but there is little doubt that he had talked over schemes likely to lead to this, and that Shaftesbury had gone further still. The Rye House plot gave an excuse for arresting the Whig leaders; Russell and Sidney were judicially murdered; Monmouth retired to Toddington in Bedfordshire, and was left untouched. Court intrigue favoring him, he succeeded, by the betrayal of his comrades and by two submissive letters, in reconciling himself with the help of Halifax both to the king and to James, though he had the humiliation of seeing his confessions and declarations of penitence published at length in the *Gazette*.

Monmouth was subpoenaed to give evidence at the trial of young Hampden. To escape from the difficulties thus opened before him he fled to Holland, probably with Charles' connivance, and, though he once more, in November, 1684, visited England, it is doubtful whether he ever again saw the king. From that time till the king's death he lived with Henrietta Wentworth, his mistress, in Holland and at Brussels.

The quiet accession of James II. soon brought Monmouth to the crisis of his fate. Though at first desirous of retirement, his character was too weak to withstand the urgency of more determined men.

On May 2d Argyll sailed with three ships to raise the west of Scotland; and three weeks later, with a following of only eighty-two persons, Monmouth himself set out for the west of England, where, as the stronghold of Protestant dissent and as the scene of his former progresses, he could alone hope for immediate support. Even here, however, there was no movement; and when on June 11th Monmouth's three ships, having eluded the royal fleet, arrived off Lyme Regis, he landed amid the curiosity rather than the sympathy of the inhabitants. In the market-place his "declaration," drawn up by Ferguson, was read aloud. In this document James was painted in the blackest colors. Not only was he declared to be the murderer of Essex, but he was directly charged with having poisoned Charles to obtain his crown. Monmouth soon collected an undisciplined body of some 1,500 men, with whom he seized Axminster and entered Taunton. Meanwhile the parliament had declared it treason to assert Monmouth's legitimacy, or his title to the crown; a reward of £5,000 was offered for him dead or alive, and an act of attainder was passed in unusual haste. Troops had been hurriedly sent to meet him, and, when he reached Bridgwater, Albemarle was already in his rear. From Bridgwater the army marched through Glastonbury to attack Bristol, into which Lord Feversham had hastily thrown a regiment of foot-guards. The attempt, however, miscarried; and, after summoning Bath in vain, Monmouth, with a disordered force, began his retrograde march through Philips-Norton and Frome, continually harassed by Feversham's soldiers. At the latter place he heard of Argyll's total rout in the western Highlands. He was now anxious to give up

the enterprise, but was overruled by Grey, Wade and others. On July 3d he reached Bridgwater again, with an army little better than a rabble, living at free quarters and behaving with reckless violence. On Sunday, the 5th, Feversham entered Sedgemoor in pursuit; Monmouth the same night attempted a surprise, but his troops were hopelessly routed. He himself, with Grey and a few others, fled over the Mendip Hills to the New Forest, hoping to reach the coast and escape by sea. The whole country, however, was on the alert, and at midnight on the 8th, within a month of their landing, James heard that the revolt, desperate from the first, was over, and that his rival had been captured close to Ringwood, in Hampshire.

The poor strain in Monmouth's character was now shown. On the day of his capture he wrote to James in terms of the most unmanly contrition, ascribing his wrong-doings to the action of others, and imploring an interview. On the 13th the prisoners reached the Tower, and on the next day Monmouth was allowed to see James. The accounts of this interview are difficult to reconcile in some points, but all agree that Monmouth's behavior was unmanly in the extreme. No mercy was shown him, nor did he in the least deserve mercy; he had wantonly attacked the peace of the country, and had cruelly libeled James. The king had not, even in his own mind, any family tie to restrain him from exercising just severity, for he had never believed Monmouth to be the son of any one but Robert Sidney. He offered, as the last hope, to become a Roman Catholic, and this might possibly have proved successful, but the priests sent by James to ascertain the sincerity of his "conversion" declared that he cared only for his life and not for his soul.

He met his death on the scaffold with calmness and dignity. In the paper which he left signed, and to which he referred in answer to the questions wherewith the busy bishops plied him, he expressed his sorrow for having assumed the royal style, and at the last moment confessed that Charles had denied to him privately, as he had publicly, that he was ever married to Lucy Walters. He died at the age of thirty-six, on July 15, 1685.

MONMOUTH, GEOFFREY OF. See GEOFFREY OF MONMOUTH.

MONOPHYSITES. See EUTYCHES and JACOBITE CHURCH.

MONOPOLI, a city of Italy, in the province of Bari, is situated on the coast of the Adriatic, twenty-five miles by rail southeast of Bari. Population, 21,000.

MONOPOLY. The original Greek meaning of this word applies strictly to the grant, by the reigning sovereign to a subject, of the right to sell some one article, to the exclusion of all competitors, or, of the right to the exclusive use of some one product. It may well be held that a PATENT (*q.v.*) is a *monopoly*—defined and terminable, but still a matter of exclusive manufacture and sale. COPYRIGHT (*q.v.*) in books is also a monopoly, but guarded by legislation. It was not until about the reign of Henry VIII., of England, that grants of monopolies of inventions or special articles of trade were made to any extent. Elizabeth granted patents of monopoly so freely that the practice became an abuse. From table forks to playing cards, everything in the nature of a new invention or introduction was granted to some hanger-on of court. The evil had attained such dimensions under James I. that in 1623 the Statute of Monopolies was passed. Since that time trade has been free in England, save for patents limited in their duration and copyrights (also limited), which are of the nature of patents.

But since the invention of labor-saving machinery,

and especially since the introduction of steam-machinery as a labor-saving factor, a new species of monopoly has grown up. With the death of the feudal system, under which the laborer preserved his individuality, subject only to the right of the lord to call upon him for war service and certain days' labor in lieu of rent, began the era of individualism. Prior to the introduction of machinery there existed a very large class of hand-workers, who, laboring in small shops or in their own homes, produced the textile fabrics, the products of iron and other metals, the manufactured foods and other necessities. With the invention of labor-saving machinery this class—the independent class of hand-workers—degenerated into the wage-workers and factory hands of the present day. Instead of an industrial army of individualists came an uncontrolled but helpless army of tenders of machinery—more helpless than the machines they tended. Capital, which of old was but the medium between the producer and the consumer, became the master of both.

It is in the United States that monopolies of all kinds have attained their fruition, and it is with their development in this country that the American people are chiefly concerned. Leaving out of consideration the postoffice monopoly (a species of State socialism which is acquiesced in by most countries), the whole system of inter-communication and of the transfer of products is in the hands of State-created monopolists. Attempts have been made, with more or less success, on the part of State legislatures, to limit the amount of tribute levied by these monopolies upon the producer and consumer, but not even the most aggressive granger legislature has as yet attempted the task of going to the root of the evil. The lion's claws have been pared; his permanent suppression has never been essayed.

Next to the railroad and express monopolies the telegraph monopoly must be reckoned as the third of the great quasi-public creations. We use the term monopoly advisedly in speaking of these, because all three exist by the consent and abetment of the State (in some cases of the nation), and could never have attained their present status without such consent and aid. The great railroads, especially the trans-continental lines, received vast grants of public lands from the United States, and the minor lines received State, county, and township bonds in aid of construction. Moreover, they invoked in every case the highest possible power of the State, the right of eminent domain, to secure their line of route. Creatures, therefore, of the State and of its subordinate entities, they should be the last to complain of State regulation, while as a matter of fact they have made themselves an *imperium in imperio*, defying all control.

The next and perhaps the most objectionable species of monopoly, and certainly the one which affords the most difficult problem of all, is the monopoly of the "trust" and the "combine." There is still some hope that by Federal or State legislation a limit may be put to the rapacity of the carrying and news-transmitting service. But the means by which to limit the grasping power of other chartered monopolies has not yet been discovered. Street railways, gas works, waterworks, and other organizations, acquire from municipalities the right to use streets, and to supply car service, water or gas to certain districts, thus forming a monopoly of the most stringent character. In many cases they obtain these franchises by indefensible means, the bribery of municipal officers being the chief. Having obtained them, the suppliant for a privilege becomes the master, and the interest of the public is lost entirely.

In addition to these must be mentioned the purely commercial "combines" and "trusts." These associations are not put to the expense of purchasing venal

municipal officers. They act by the power of capital alone. Their system is to acquire by purchase a controlling interest in some article of common use, for example, illuminating oil. Having purchased a majority of the oil-wells, for instance, they decree that the natural product of the wells shall be limited in order to raise the price. Small producers who dare to oppose the organization are driven out of the field by under-selling, and as soon as they are disposed of the consumer is charged whatever price the "combine" pleases. The same is true of sugar, twine, and scores of articles of common use.

MONOTHELITES (*monothelitæ*) was the name given to those who, in the seventh century, while otherwise orthodox, fell into the heresy of maintaining that Christ had only one will. The monothelite controversy had its origin in the efforts of the emperor Heraclius to win back for the church and the empire the excommunicated and persecuted Monophysites or Eutychians of Egypt and Syria.

MONREALE, a contraction of "monte-reale," was so called from a palace built there by the Norman Roger I., king of Sicily. It is now a town of about 16,300 inhabitants, situated five miles inland from Palermo, on the slope of Mount Caputo.

MONROE, JAMES, fifth president of the United States, was born April 28, 1758, in the county of Westmoreland, Va. At the outbreak of the Revolutionary war, James Monroe was a student at the College of William and Mary, but left his studies in 1776 to join the continental army. He took part as lieutenant in the New Jersey campaign of that year, and was wounded at the battle of Trenton. The next year he served with the rank of captain on the staff of General William Alexander ("Lord Stirling"), but, thus being out of the line of promotion, he soon found himself without military employment. In 1780 he began the study of the law under the direction of Jefferson, then governor of Virginia. His intimacy with Jefferson at this time had probably a controlling influence upon his subsequent political career. He continued through all vicissitudes to possess the friendship and support of both Jefferson and Madison.

In 1782 Monroe was in the State legislature, and from 1783 to 1786 was a member of Congress. On retiring from Congress he entered upon the practice of the law at Fredericksburg, and was again elected to the legislature. In the Virginia convention of 1788 for the ratification of the constitution, he was among the opponents of that instrument; but his course was approved by the legislature of his State, which elected him United States senator in 1790 to fill the vacancy caused by the death of William Grayson. As senator he was a decided opponent of the Federalist administration. Nevertheless he was selected by Washington in 1794 as minister to France in place of Gouverneur Morris, a Federalist, recalled upon the request of the French Government. Being of the party which sympathized with the revolutionary struggle in France, it was expected that his appointment would be flattering to the government of that country, and would also conciliate the French party at home. The Government of the National Convention received Monroe with open signs of favor, and on his part he expressed his own and his country's sympathy with the French Republic with so much enthusiasm that Washington deemed his language not in keeping with the neutral policy which the administration had recently proclaimed. At about the same time John Jay had negotiated a treaty of amity and commerce with England which gave great umbrage to France. It was alleged that the earlier treaty of 1778 with France was violated by the stipulations of the Jay treaty;

and the Directory seemed disposed to make of this a *casus belli*. In this emergency it was believed by Washington and his advisers that Monroe failed to represent properly the policy of the government, and he was therefore recalled in 1796. In justification of his diplomatic conduct, he published the next year his *View*, a pamphlet of 500 pages. In 1799 he became governor of Virginia, and was twice reelected. In the meantime the Republican party had come into power, with Jefferson as president, and Monroe was again called upon to fill an important diplomatic station. He was commissioned on January 10, 1803, to act with Livingston, resident minister at Paris, in negotiating the purchase of New Orleans and the territory embracing the mouth of the Mississippi, which formed a part of the province of Louisiana, recently ceded by Spain to France. In view of the anticipated renewal of hostilities between England and France in 1803, Napoleon was anxious, for a consideration, to part with his new acquisition, which in the event of a war with England he would probably lose by conquest. The American commissioners met, therefore, with little difficulty in the accomplishment of their object. But, in the absence of instructions, they assumed the responsibility of negotiating the purchase not only of New Orleans but of the entire territory of Louisiana—an event that is hardly second in importance to any in the history of this country. Monroe was next commissioned as minister to England, to succeed Rufus King, who had resigned. In 1804 he undertook a mission to Madrid, with the object of negotiating the purchase of the Floridas; but in this he was unsuccessful, and returned to London in 1805. The next year he was joined in a commission with William Pinckney to negotiate a treaty with England to take the place of the Jay treaty, which expired in that year. Lords Auckland and Howick having been appointed on the part of England, a treaty was concluded on the last day of the year, which was perhaps more favorable to the United States than the Jay treaty; but, like the latter, it contained no provision against the impressment of American seamen. For this reason President Jefferson refused to submit it to the Senate for ratification, but sent it back for revision. In the meantime Canning had become foreign secretary in place of Fox, and refused to reopen the negotiation. Monroe returned to the United States in 1807, and, as in the case of his first French mission, he drew up a defense of his diplomatic conduct in England. In 1808 certain disaffected Republicans attempted to put Monroe forward as the candidate for the presidency, but as Virginia declared in favor of Madison, Monroe withdrew his name. In 1810 he was again in the legislature of his native State, and the next year its governor. But in this year he was called from the state to the national council, superseding Robert Smith as secretary of state in Madison's cabinet, and he took an active part in precipitating the war against England in 1812. On the retirement of Armstrong, after the capture of Washington in 1814, Monroe assumed the duties of the war department in addition to those of the state department, and by his energy and decision infused something of vigor into the conduct of the war. He was elected president in 1816, and was reelected in 1820 without opposition. The period of his administration (1817–25) has been called "the era of good feeling," for the reason that the party issues of the past were mostly dead, and new issues had not yet arisen. In the formation of his cabinet Monroe showed the soundness of his judgment, selecting for the leading positions J. Q. Adams, J. C. Calhoun, W. H. Crawford, and William Wirt. With these able advisers he devoted himself to the

economic development of the country, which had been so long retarded by foreign complication. As president, moreover, he was able to accomplish in 1819 the acquisition of the Floridas, which as minister to Spain he had failed to do in 1804, and to define the boundary of Louisiana, which he had been the agent in purchasing in 1803. But Monroe is best known to later generations as the author of the so-called "Monroe doctrine," a declaration inserted in his seventh annual message, December 2, 1823. It was the formulation of the sentiment, then beginning to prevail, that America was for the Americans. One of the principles of the neutral policy of the country, which had been established with much difficulty, had been that the United States would not interfere in European politics; and now this policy was held to include the converse as a necessary corollary—that is, that Europe should not interfere in American politics, whether in North America or South America. The occasion of proclaiming this doctrine was the rumored intervention of the Holy Alliance to aid Spain in the reconquest of her American colonies. President Monroe believed that such a policy entered upon by the allied continental powers of Europe would be dangerous to the peace and safety of the United States; he therefore declared that "we would not view any intervention for the purpose of oppressing them (the Spanish American states) or controlling in any manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the United States." This declaration, together with the known hostility of England to such a project, was sufficient to prevent further action on the part of the Alliance. (See MONROE DOCTRINE.)

On the expiration of his presidential term Monroe retired to Oak Hill, his residence in Loudoun county, Va.; but at the time of his death, July 4, 1831, he was residing in New York.

MONROE, a city of the United States, county seat of Monroe county, Mich., lies thirty-two miles south-southwest of Detroit, on the Raisin river, three miles inland from Lake Erie, with which it has been connected by a ship canal since 1843. It is a station on the Canada Southern, the Flint and Père Marquette, and the Detroit division of the Lake Shore and Michigan Southern Railways. Agricultural implement factories, a spoke and hub factory, foundries and engineering-works, carriage-works, grist-mills, paper-mills, and fruit-drying establishments are in operation. From 400 to 500 tons of grapes are shipped yearly from the neighboring vineyards, and over 100,000 gallons of wine are made here. The population is 5,246. Settled as Frenchtown by a body of Canadians in 1784, Monroe received its present name, in honor of President Monroe, in 1817. Its city charter dates from 1837. It was the scene of the battle of the river Raisin, January 22, 1813.

MONROE DOCTRINE. The policy of the United States in regard to foreign affairs was first proclaimed by President Washington, and was re-asserted by President Monroe. Warned by the unfortunate course of the first French Republic, which entered upon a propaganda of republicanism with most disastrous results, the great Republic of the West declared that while anxious to preserve peace and friendship with all nations it would make entangling alliances with none. There is no doubt that Jefferson shared the views of Washington with respect to the advisability of refraining from foreign complications, and that he also held firmly to the doctrine that while the United States would not interfere with other nations, no interference by foreign governments with American affairs would be tolerated.

But it was reserved for James Monroe, fifth President of the United States, to formulate the doctrine which, universally accepted at the time, has grown and strengthened with years, and which to-day more than ever stands as the American policy. It was in 1823, when the Holy Alliance ruled in Europe and the Spanish-American countries rose in rebellion against their European masters, that the occasion came. Great Britain and the United States had acknowledged the independence of the revolted States. It was thought probable that the Holy Alliance would attempt by force to restore the Spanish control, and Monroe in a message to congress, designed to reach further than to its nominal address, enunciated the policy of the United States in the following words:

"We owe it, therefore, to candor and to the amicable relations existing between the United States and the allied powers to declare that we should consider any attempt on their part to extend their system to any part of this hemisphere as dangerous to our peace and safety. With the existing colonies or dependencies of any European power we have not interfered and shall not interfere, but with the governments who have declared their independence and maintained it, and whose independence we have on great consideration and just principles acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny by any European power in any other light than as the manifestation of an unfriendly disposition toward the United States."

This authoritative statement of the position of the United States had the desired effect. John Q. Adams, when president, proposed the holding of a Congress of the South and Central American republics, but the proposition came to nothing. But the underlying principle has become incorporated in the national life. It shaped the policy of the nation in regard to the Mexican situation in 1867, and it has led in later days to the calling of the Pan-American Congress, the results of which are still in embryo. For good or for evil the Monroe doctrine has been adopted as the American doctrine, and its force lies in the fact that it is supported by public opinion.

MONROVIA. See LIBERIA.

MONS, a town of Belgium, the capital of the province of Hainault, on the rivers Haine and Trouille, and thirty-one miles southwest of Brussels. The population in 1890 was 28,200.

MONSTER. Monsters or monstrous births are the subject of animal teratology, a department of morphological science treating of deviations from the normal development of the embryo. The term "embryo" is conventionally limited, in human anatomy, to the ovum in the first three months of its intra-uterine existence, while it is still developing or acquiring the rudiments of its form, the term "foetus" being applied to it in the subsequent months during which the organism grows on the lines of development already laid down. It is mostly in the first or embryonic period that those deviations from the normal occur which present themselves as monstrosities at the time of birth; these early traces of deviation within the embryo may be slight, but they "grow with its growth and strengthen with its strength," until they amount to irreparable defects or accretions, often incompatible with extra-uterine life. The name of "teratology," introduced by Étienne Geoffroy St. Hilaire (1822), is derived from the Greek *teras*, the equivalent of *monstrum*; teratology is a term new enough to have none but scientific associations, while the Latin word has a long record of superstitions identified with it. The myths of siren, satyr, Janus, cyclops, and the like, with the corresponding figures in

Northern mythology, find a remote anatomical basis in monstrosities which have, for the most part, no life except in the foetal state. The mythology of giants and dwarfs is, of course, better founded. Although monstrosities, both in the human species and in other animals, tend to repeat certain definite types of erroneous development, they do not fall readily into classes. It is remarked by Vrolik that scientific classification is impracticable from being too cumbrous, and that a convenient grouping is all that need be attempted.

The abnormality may extend to the body throughout, as in well-proportioned giants and dwarfs; or it may affect a certain region or member, as—to take the simplest case—when there is a finger or toe too many or too few. It is very common for one malformation to be correlated with several others, as in the extreme case of acardiac monsters, in which the non-development of the heart is associated with the non-development of the head and with other radical defects.

Giants are conventionally limited to persons over seven feet in height. The normal proportions of the frame are adhered to more or less closely, except in the skull, which is relatively small; but accurate measurements, even in the best-proportioned cases, prove, when reduced to a scale, that other parts besides the skull, notably the thigh-bone and the foot, may be undersized though overgrown.

Dwarfs are conventionally limited to persons under four feet. They are more likely than giants to have the modulus of the body perfect. As in the case of giants, dwarfs are seldom the progeny of dwarfs, who are, in fact, usually sterile; the unnatural smallness may be obvious at birth, but is more likely to make itself manifest in the years of growth. Dwarfs are much more easily brought up than giants, and are stronger and longer lived; they have usually also strong passions and acute intelligence. The legends of the dwarfs and giants are on the whole well based on fact.

Imperfect closure along either of the embryonic lines of junction may produce various degrees of monstrosity. The simplest and commonest form, hardly to be reckoned in the present category, is harelip with or without cleft palate, which results from defective closure of the ventral laminae at their extreme upper end. Another simple form, but of much more serious import, is a gap left in the neural canal at its lower end; usually the arches of the lumbar vertebræ are deficient, and the fluid that surrounds the spinal cord bulges out in its membranes, producing a soft tumor under the skin at the lower part of the back. This is the condition known as *hydrorhachis*, depending on the osseous defect known as *spina bifida*. Children born with this defect are difficult to rear, and are very likely to die in a few days or weeks. More rarely the gap in the arches of the vertebræ is in the region of the neck. If it extend all along the back, it will probably involve the skull also. Deficiency of the crown of the head, and in the spine as well, may be not always traceable to want of formative power to close the canal in the middle line; an over-distended condition of the central water canal and water spaces of the cord and brain may prevent the closure of the bones, and ultimately lead to the disruption of the nervous organs themselves, and injuries to the mother, with inflammation set up in the foetus and its appendages, may be the more remote cause. But it is by defect in the middle line that the mischief manifests itself, and it is in that anatomical category that the malformations are included. The osseous deficiency at the crown of the head is usually accompanied by want of the scalp, as well as of the brain and membranes. The bones of the face may be well developed, and the features regular, except that

the eyeballs bulge forward under the closed lids; but there is an abrupt horizontal line above the orbits where the bones cease, the skin of the brow joining on to a spongy kind of tissue that occupies the sides and floor of the cranium. This is the commonest form of an *anencephalous* or brainless monster. Vegetative existence is not impossible, and a brainless monster has been known to survive sixty-five days. The child is usually a very large one.

Closely allied, as we have seen, to the anencephalous condition is the condition of congenital *hydrocephalus*. A hydrocephalic foetus may survive its birth, and will be more apt to be affected in its nutrition than in its intelligence. In many cases the hydrocephalic condition does not come on till after the child is born. The *microcephalous* condition, where it is not a part of cretinism, is not usually a congenital defect in the strict sense, but more often a consequence of the premature union of the bones of the skull along their sutures or lines of growth.

Hermaphroditism.—Although this anomalous condition does not fall under defective closure in the middle line, it may be said to be due to a similar failure of purpose, or to an uncertainty in the *nisus formativus* at a corresponding stage of development. There is a point of time, falling about the eighth week, up to which the embryo may develop either the reproductive organs of the male or the reproductive organs of the female; in the vast majority of cases the future development and growth are carried out on one line or the other, but in a small number there is an ambiguous development leading to various degrees of hermaphroditism or doubtful sex. The primary indecision, so to speak, affects only the ovary or testis respectively, or rather the common germinal ridge out of which either may develop; the uncertainty in this embryonic sexual ridge sometimes leads actually to the formation of a pair of ovaries and a pair of small testes, or to an ovary on one side and a testis on the other; but even when there is no such double sex in the essential organs (as in the majority of hermaphrodites) there is a great deal of doubling and ambiguity entailed in the secondary or external organs and parts of generation. Those parts which are rudimentary or obsolete in the male but highly developed in the female, and those parts which are rudimentary in the female but highly developed in the male tend in the hermaphrodite to be developed equally, and all of them badly. In some cases the external organs of one sex go with the internal organs of the opposite sex. It has been observed that when middle life is reached or passed the predominance in features, voice, and disposition leans distinctly toward the masculine side.

Another curious result of defective separation of symmetrical parts is the siren form of foetus, in which the lower limbs occur as a single tapering prolongation of the trunk like the hinder part of a dolphin, at the end of which a foot (or both feet) may or may not be visible. The defects in the bones underlying this siren form are very various: in some cases there is only one limb (thigh and leg-bones) in the middle line; in others all the bones of each limb are present in more or less rudimentary condition, but adhering at prominent points of the adjacent surfaces. The pelvis and pelvic viscera share in the abnormality. A much more common and harmless case of unseparated symmetrical parts is where the hand or foot has two, three, or more digits fused together. This syndactylous anomaly runs in families.

Allied to these fused or unseparated states of the extremities, or parts of them, are the class of deformities in which whole limbs are absent, or represented only

by stumps. The trunk (and head) may be well formed, and the individual healthy; all four extremities may be reduced to short stumps either wanting hands and feet entirely, or with the latter fairly well developed; or the legs only may be rudimentary or wanting, or the arms only, or one extremity only. Although some of these cases doubtless depend upon aberrant or deficient formative power in the particular directions, there are others of them referable to the effects of mechanical pressure, and even to direct amputation of parts within the uterus.

Twins are the physiological analogy of double monsters, and some of the latter have come very near to being two separate individuals. Triple monsters are too rare to dwell upon, but their analogy would be triplets. The Siamese twins, who died in 1874 at the age of sixty, were joined only by a thick fleshy ligament from the lower end of the breast-bone (xiphoid cartilage), having the common navel on its lower border; the anatomical examination showed, however, that a process of peritoneum extended through the ligament from one abdominal cavity to the other, and that the blood-vessels of the two livers were in free communication across the same bridge. There are one or two cases on record in which such a ligament has been cut at birth, one, at least, of the twins surviving. From the most intelligible form of double monstrosity, like the Siamese twins, there are all grades of fantastic fusion of two individuals into one down to the truly marvelous condition of a small body or fragment parasitic upon a well-grown infant—the condition known as *fetus in fetu*. These monstrosities are deviations, not from the usual kind of twin gestation, but from a certain rarer physiological type of dual development. In by far the majority of cases twins have separate uterine appendages, and have probably been developed from distinct ova; but in a small proportion of (recorded) cases there is evidence, in the placental and inclosing structures, that the twins had been developed from two rudiments arising side by side on a single blastoderm. It is to the latter physiological category that double monsters almost certainly belong; and there is some direct embryological evidence for this opinion. The Siamese twins are an instance of union at the umbilical region, with the viscera distinct in every respect except a slight vascular anastomosis and a common process of peritoneum; but it is more usual for union in that region to be more extensive, and to entail a single set of abdominal and thoracic viscera. The pelvis is one of the commonest regions for double monsters to be joined at, and, as in the head and abdomen, the junction may be slight or total. The Hungarian sisters Helen and Judith (1701–1723) were joined at the sacrum, but had the pelvic cavity and pelvic organs separate; the same condition obtained in the South Carolina negresses Millie and Christine, known as the “two-headed nightingale,” and in the other recent case of the Bohemian sisters Rosalie and Josepha. More usually the union in the pelvic region is complete, and produces the most fantastic shapes of two trunks (each with head and arms) joining below at various angles, and with three or four lower limbs extending from the region of fusion, sometimes in a lateral direction, sometimes downward. A very curious kind of double monster is produced by two otherwise distinct foetuses joining at the crown of the head and keeping the axis of their bodies in a line. It is only in rare instances that double monsters survive their birth, and the preserved specimens of them are mostly of foetal size.

MONSTRELET, ENGUERRAND DE (who, rather owing to accident than to merit, held, until within the present century, the same position as chronicler of French affairs during the early part of the fifteenth

century as Froissart holds with regard to the last half of the fourteenth), was born at an uncertain date, apparently not later than 1400, and died in July, 1453.

MONTAGU, LADY MARY WORTLEY, one of the most brilliant letter-writers of the eighteenth century, was born at Thoresby in Nottinghamshire in 1690, and was the daughter of the Duke of Kingston. Her mother died when she was a child, and by some chance she received or gave herself an unusually wide literary education, had the run of her father's library, was encouraged in her studies by Bishop Burnet, and while still a girl translated the *Enchiridion* of Epictetus. After a courtship in which she showed a singular power of thinking for herself, she was married, in 1712, against her father's wish, to Mr. E. Wortley Montagu, an accomplished and scholarly friend of the Queen Anne wits. At the new court of George I. her beauty and wit brought her much homage; Pope was among her most devoted worshipers, and she even gained and kept the friendship of the great duchess of Marlborough. Her husband being appointed ambassador to the Porte in 1716, she accompanied him to Constantinople, and wrote to her friends at home brilliant descriptions of Eastern life and scenery. These letters were not published till 1763. In one of them she described the practice of inoculation for the smallpox, and announced her intention of trying it on her own son, and of introducing it in spite of the doctors into England. The most memorable incident in her life after her return from the East was her quarrel with Pope, caused, according to her account, by her laughing at him when he made love to her in earnest. He satirized her under the name of Sappho, and she teased him with superior ingenuity and hardly inferior wit. From 1739 to 1761 Lady Mary lived abroad, apart from her husband, maintaining an affectionate correspondence with her daughter, Lady Bute. She died August 21, 1762.

MONTAIGNE, MICHEL DE, essayist, was born February 28, 1533. At six years old, Montaigne was sent to the Collège de Guienne at Bordeaux, then at the height of its reputation, having more than double the number of scholars (two thousand) that even the largest English public school has usually boasted. Among its masters were Buchanan, afterward the teacher of James I., and Muretus, one of the first scholars of the age. These, with their colleague Guérente, composed Latin plays for their pupils to act, and are held to have given no small impulse to the production of the classical French tragedy. Montaigne remained at school seven years, and, like almost all Frenchmen of all times, retained no pleasant or complimentary memory of it. At thirteen he left the Collège de Guienne and began to study law, it is not known where, but probably at Toulouse, the most famous university, despite its religious intolerance, of the south of France. Of his youth, early manhood, and middle life extremely little is known. Allusions to it in the *Essays* are frequent enough, but they are rarely precise. In 1548 he was at Bordeaux during one of the frequent riots caused by the gabelle, or salt tax. Six years afterward, having attained his majority, he was made a counselor in the Bordeaux parliament. In 1558 he was present at the siege of Thionville.

Between the publication of his first two books of essays in 1580, and the publication of the third in 1588, Montaigne's life as distinguished from his writings becomes somewhat better known, and somewhat more interesting. He had, during the eight years of composition of his first volume, visited Paris occasionally and traveled for health or pleasure to Cauterets, Eaux Chaudes, and elsewhere. Charles IX., apparently, had made him one of his gentlemen in ordinary, and perhaps conferred on him the order of St. Michael.

In 1588, after a visit of some length to Paris, the third book of the *Essays* was published, together with the former ones considerably revised. The new essays differ strikingly from the older ones in respect of length; there being only one which confines itself to the average of those in the first two books. The whimsical unexpectedness of the titles, moreover, reappears in but two of them: *Des coches* and *Des boiteux*. They are, however, identical with the earlier ones in spirit, and make with them an harmonious whole—a book which has hardly been second in influence to any of the modern world.

Montaigne is one of the few great writers who have not only perfected but have also invented a literary form. The essay as he gave it had no forerunner in modern literature, and no direct ancestor in the literature of classical times.

Montaigne did not very long survive the completion of his book. His sojourn at Paris for the purpose of getting it printed was by no means uneventful, and on his way he staid for some time at Blois, where he met De Thou. In Paris itself he had a more disagreeable experience, being for a short time committed to the Bastille by the Leaguers, as a kind of hostage, it is said, for a member of their party who had been arrested at Rouen by Henry of Navarre. But he was in no real danger. He was well known to and favored by both Catherine de' Medici and the Guises, and was very soon released. In Paris, too, at this time he made a whimsical but pleasant friendship. Marie le Jars, Demoiselle de Gournay, one of the most learned ladies of the sixteenth and seventeenth centuries, had conceived such a veneration for the author of the *Essays* that, though a very young girl and connected with many noble families, she traveled to the capital on purpose to make his acquaintance. He gave her the title of his "fille d'alliance" (adopted daughter), which she bore proudly for the rest of her long life. She lived far into the seventeenth century, and became a character and something of a laughing-stock to the new generation; but her services to Montaigne's literary memory were great. Of his other friends in these last years of his life the most important were Étienne Pasquier and Pierre Charron. Montaigne died September 11, 1592.

MONTALEMBERT, CHARLES FORBES DE, historian, was born May 29, 1810. Montalembert's father, René, emigrated, fought under Condé, and subsequently served in the English army. He married a Miss Forbes, and his eldest son Charles was born at London. At the Restoration René de Montalembert returned to France, was raised to the peerage in 1819, and became ambassador to Sweden (where Charles received much of his education) in 1826. He died a year after the overthrow of the legitimate monarchy. Charles de Montalembert was too young to take his seat as a peer (twenty-five being the necessary age), but he retained other rights; and this, combined with his literary and intellectual activity, made him a person of some importance. He was formally charged with unlicensed teaching. He claimed the right of trial by his peers, and made a notable defense, of course with a deliberate intention of protest. His next most remarkable act was his participation in the famous pilgrimage to Rome of his two friends. Montalembert submitted dutifully to the encyclical of June, 1835, and only devoted himself more assiduously to the work on which he was engaged, the *Life of St. Elizabeth of Hungary*. This appeared in 1836. It displayed Montalembert's constant literary characteristics, and, though inferior to *Les Moines d'Occident* in research and labor, is perhaps superior to it as a work of art. Montalembert still

clung to his early liberalism, and he made himself conspicuous during the reign of Louis Philippe by his protests against the restrictions imposed on the liberty of the press, besides struggling for freedom in national education. The party which he represented, or rather which he strove to found, was by no means wholly Legitimist at heart, and at the downfall of Louis Philippe Montalembert had no difficulty in accepting the republic and taking, when elected, a seat in the assembly. He had not a little to do with the support given by France to the pope. As he had accepted the republic, he was not disinclined to accept the empire; but the measures which followed the *coup d'état* disgusted him, though he still sat in the chamber. A defeat in 1857 put an end to his parliamentary appearances. He was still, however, recognized as one of the most formidable of the moderate opponents of the empire, and he was repeatedly prosecuted for anti-imperialist letters and pamphlets. In the ten years between 1840 and 1850 he wrote little but political pamphlets, but after the establishment of the empire, and especially after he lost his seat in the chamber, he became more prominent as an author. Even before this he had produced a volume on the *Avenir Politique de l'Angleterre* (1855), and another on *Pie IX. et Lord Palmerston* (1856), besides numerous articles and pamphlets, the chief of which were perhaps *Une Nation [Poland] en Deuil*, and *L'Église Libre dans l'État Libre*.

His great work, the fruit of many years' labor, did not appear till he was fifty years old, and ten years before his death, which occurred before its completion. Montalembert, who had married Mademoiselle de Merode, sister of one of Pius IX.'s ministers, but who had no male offspring, died in March, 1870.

MONTALVAN, JUAN PEREZ DE, Spanish dramatist and writer of fiction, was the son of the king's bookseller, and was born at Madrid in 1602. At the early age of seventeen he became a licentiate in theology, and in 1626, after entering the priesthood, he received a notarial appointment in connection with the Inquisition. His overtasked brain succumbed under the numerous literary labors he imposed on it, and he died when only thirty-six years old (June 25, 1638).

MONTANA was admitted to the Union in 1889. The country was originally acquired by the United States under the Louisiana purchase. It became successively a part of Louisiana Territory, of Missouri Territory, of Nebraska Territory, and of Dakota. On May 26, 1864, it was organized under a Territorial government of its own, with practically its present boundaries. The exploration of this region commenced with the celebrated expedition of Lewis and Clarke in 1803-1806. Between 1850 and 1855 it was traversed and mapped by a number of exploring parties, having in view the selection of transcontinental railroad routes. Since then numberless expeditions have examined it, and some systematic topographic work has been done under different branches of the United States Government. The first settlers entered the Territory in 1861, discovered placer gold on Little Prickly Pear Creek, and shortly after built the city of Helena. Later, the placers at Bannack were discovered, and a small "rush" to the Territory commenced. In 1863 the rich placers at Alder Gulch were brought to view, and miners and adventurers swarmed in from all parts. Then it was that the early social history of California was repeated on a smaller scale in Montana. The lawless element assumed control, and for many months neither life nor property was safe. Indeed, for a time the community was in a state of blockade; no one with money in his possession could get out of the Territory. Finally, the citizens organized

a "Vigilance Committee" for self-preservation, took the offensive, and, after a short, sharp struggle, rid the community of its disturbing elements.

The State is bounded on the north by British Columbia, south by Wyoming and Idaho, west by Idaho, and east by the Dakotas. Its approximate area is 146,000 square miles. Topographically, Montana may be separated into two great divisions—that of the plains, comprising the eastern two-thirds, and that of the mountains, comprising the western portion. The former, a monotonous rolling expanse, broken only by the beds of the few streams which traverse it, and by a few small groups of hills, extends over nine degrees of longitude in a gentle uniform slope, rising from 2,000 feet above the sea at the eastern boundary to 4,000 feet at the base of the Rocky Mountains. Except along the streams and upon the scattered groups of hills, this section is entirely devoid of forest-growth of any kind. Vegetation is limited to the bunch grasses, artemisia, and cacti. The grasses are the most abundant and luxuriant near the mountains, where the rainfall is greatest. The mountain section, comprising the western third of the State, is composed, in general terms, of a succession of ranges and valleys running very uniformly somewhat in a northwest and southeast direction. The mountains vary in height from 8,000 to 10,000, even in isolated cases reaching 11,000 feet, with mountain passes 6,000 to 8,000 feet above the sea. In the mountainous part of the State are the headwaters of the Missouri (Atlantic basin) and Clarke's Fork of the Columbia (Pacific basin). The former rises in the southwest of the State in three large branches, the Jefferson, Madison, and Gallatin, which meet at the foot of the Gallatin valley at a point known as the "Three Forks of the Missouri." Here the Missouri is a good-sized stream, fordable with difficulty even when the current is lowest. From this point to its mouth navigation is possible when the stream is not below its mean height; it is interrupted only at the Great Falls of the Missouri, near Fort Benton, above which, however, it is practically little used for navigation. Its other principal tributaries in its upper course are the Sun, Teton, Marias, Musselshell, and Milk rivers, all of which vary much in size with the season—the last two being nearly or quite dry near their mouths in the fall of the year. The Yellowstone, one of the most important tributaries of the Missouri, has nearly all its course in Montana, and is navigable for small steamers as far as the Crow Agency, except when the water is low. Clarke's Fork of the Columbia is formed by the junction of the Flathead and the Missoula or Hellgate river. The former rises in the mountains of British Columbia and flows nearly south through Flathead Lake to its point of junction with the Missoula. The latter rises opposite the Jefferson river and flows northwestward, receiving on its way several large affluents. Below the point of junction of these streams, Clarke's Fork flows northwest along the base of the Bitter-root Mountains into Idaho. This stream is very rapid, and is not navigable. Its course, as well as those of most of its tributaries, passes through narrow valleys, the surrounding country being well-watered and covered with dense forests of *Coniferae*.

The climate of Montana differs almost as greatly in different parts of the State as that of California. In the northwest it resembles that of the Pacific coast. The westerly winds blowing off the Pacific do not meet with as formidable a barrier as farther south, and consequently are not chilled, or deprived of so large a proportion of their moisture. The result is that the northwestern portion of Montana enjoys a mild temperature and a rainfall sufficient for the needs of agriculture.



The valleys of the Kootenai, Flathead, Missoula, and Bitter-root can be cultivated without irrigation with little danger of loss from drought. Farther east and south the rainfall decreases. In the valleys of the upper Missouri, the Jefferson, Madison, Gallatin, and the upper Yellowstone irrigation is almost everywhere required, as well as over the broad extent of the plains. Over most of the State the rainfall ranges from ten to fifteen inches annually; in the northwestern corner it rises to twenty-five.

The general temperature is comparatively mild for the latitude, the elevation above the sea being decidedly less than that of the average of the Rocky Mountain region. The mean annual temperature ranges from 40° to 50° Fahr., but the variations are very great and violent. Frosts and snowstorms are possible during every month of the year, so that agriculture and stock-raising are more or less hazardous. On the other hand, the ordinary extremes of temperature are not so great as in the more arid portions of the country.

Throughout the State, as everywhere else in the Cordilleran region, forests follow rainfall. The plains are treeless; the mountain valleys about the heads of the Missouri are clothed only with grass and artemisia, in many localities extending to a considerable height up the mountains, which are themselves timbered, though not heavily. In the northwestern part, roughly defined as the drainage area of Clarke's Fork, where the rainfall is somewhat greater, the forests become of importance. The mountains are forest-clad from summit to base; and the narrower valleys are also covered, while the timber is of larger size and of much greater commercial value than elsewhere in the State—the valuable timber consisting entirely of the various species of *Coniferae*, pine, fir, cedar, etc. Of the broad-leaved species, willow, aspen, and cotton-wood are abundant.

The native fauna is not sharply distinguished from that of neighboring States and Territories. The higher latitude is, however, indicated by the relatively greater abundance of species favoring a colder climate. The moose and the Rocky Mountain goat, though by no means abundant, still frequent chosen haunts in the mountains—the former in the cool marshy valleys, the latter upon the most rugged inaccessible elevations. The black-tailed and mule deer, the antelope, elk, and mountain sheep are abundant, and the bison still ranges the plains, though in sadly reduced numbers. Among *Carnivora*, the black and grizzly bears, mountain lion, lynx, wild cat, and several species of wolves are still plentiful.

Agriculture is dependent in most parts of Montana upon the supply of water furnished by the streams. Owing to this fact it is probable that not more than 8 per cent. of the total area of Montana can ever, even under the most economical distribution of the water-supply, be brought under cultivation. In the drainage area of Clarke's Fork are several fine valleys containing a considerable extent of arable land, such as those of the Missoula, Bitter-root, Deer Lodge, Jocko and Flathead. Upon the head-waters of the Missouri is also a large extent of arable land. The valleys of the Jefferson and Madison also deserve mention. Along the eastern base of the mountains, near the head-waters of the Sun, Teton, and Marias rivers, are considerable areas susceptible of irrigation. Below the Forks the Missouri flows for seventy-five miles through a broad valley, much of which can be irrigated; below Fort Benton, however, the bluffs become higher and close in on the river. The Yellowstone, also, after leaving the mountains, flows through a similar kind of valley, which extends with a few minor breaks down to the point where the river turns from an east to a northeast

course, when it enters a country of *mauvaises terres*, which, except as a mausoleum of fossil remains, is utterly valueless.

Montana is rich in minerals, the principal being gold, silver, copper, and lead. More than 12,000 mining claims have been located under the United States mining laws, but few of the mines have been developed. No reliable statistics of the metal output are obtainable, but the claim is made that Montana leads all other States in the amount of its production of gold and silver. In 1889 twelve of the leading mines paid dividends amounting to \$3,714,250.

Of the 90,000,000 acres in the State about two-fifths are supposed to be cultivatable, and about 4,000,000 acres are returned for taxation. Grain is grown chiefly in Gallatin and Bitter Root valleys, but the great need of Montana is irrigation, and without this the growth of the cereals is scarcely possible. The State is rich in timber, and has large deposits of bituminous coal, not yet developed. The United States census returns for 1890 showed a population of 132,159, but at the census of 1880 there were less than 40,000. In 1888 the vote for delegate to Congress was 40,014, which at the estimate of one vote to four inhabitants, would show 160,000 people.

The assessment of Montana in 1888 was \$67,430,533 and there is no public debt. The tax levy under the Territorial administration was only two mills on the dollar. In 1888, 452,484 acres of public lands were settled upon. On January 1, 1889, the mileage of completed railroads was 1,785, and there were 283 miles in course of construction. An official estimate of the products exported in 1889, gives the following figures:

Gold and silver.....	\$24,000,000
Copper.....	12,000,000
Lead.....	1,000,000
Beef cattle and horses.....	5,000,000
Sheep for market.....	1,000,000
Wool.....	2,350,000
Hides, pelts, etc.....	400,000
Total.....	\$45,750,000

The total number of cattle in 1889 was estimated at 1,250,000; horses, 220,000; sheep, 2,150,000. The wool product for 1889 was estimated at 12,000,000 pounds. The capital and chief city of Montana is Helena (*q.v.*), a thriving town of 13,834 people.

MONTANISM is a somewhat misleading name for the movement in the second century which, along with Gnosticism, occupied the most critical period in the history of the early church. It was the overthrow of Gnosticism and Montanism that made the "Catholic" church.

MONTARGIS, chief town of an arrondissement in the department of Loiret, France, lies forty miles east-northeast of Orleans on the railway from Paris to Lyons. Population (1890), 10,000.

MONTAUBAN, chief town of the department of Tarn-et-Garonne, France, is situated on a slight eminence between the right bank of the Tarn and its tributary streams, the Tescou and Lagarrigue, 128 miles by rail east-southeast of Bordeaux. The population is 28,335.

MONTBÉLIARD, chief town of an arrondissement in the department of Doubs, France, is situated at the confluence of the Allaine and the Lusine, tributaries of the Doubs, and on the canal between the Rhine and the Rhone, about forty miles northeast of Besançon. Once a fortified city, it still retains the old castle of the counts of Montbéliard. A bronze statue of Cuvier, the most illustrious native of Montbéliard, and several fine fountains adorn the town, which also possesses a museum of natural history and antiquities, and a Protestant normal school. Population (1890), 9,000.

MONTCLAIR, a town of Essex county, N. J., with a population of 6,300.

MONTE CARLO. See **MONACO**.

MONTE CASINO (or **CASSINO**). The Benedictine monastery, known as the abbey of Monte Cassino, is a huge square building of three stories, built on the usual Benedictine plan (see **ABBEY**) on the summit of a picturesque isolated hill, about three and a-half miles to the northeast of the town of Cassino (Casinum) or San Germano (population about 5,000), which lies midway between Rome and Naples in the valley of the Garigliano. The most prominent architectural feature is the large church (1727), richly decorated in the interior with marbles, mosaics, and paintings.

MONTECUCULI, **RAIMONDO**, COUNT OF, a prince of the empire and duke of Melfi, a famous Austrian general, was born at the castle of Montecuculi in Modena, in 1608. At the age of nineteen he began his career in a regiment of infantry under his uncle, Ernest, count of Montecuculi; and during the Thirty Years' War he found many opportunities of displaying his military genius in the imperial service. Montecuculi's last achievement in war was the siege of Philippsburg. During the rest of his life he was president of the council of war. In 1679 the emperor Leopold made him a prince of the empire, and shortly afterward he received from the king of Naples the dukedom of Melfi. Having accompanied the emperor to Linz during the pestilence, he was injured by the fall of a beam when entering the castle, and died at Linz on October 16, 1680.

MONT-DORE-LES-BAINS, a village of France in the department of Puy de Dôme, seventeen miles as the crow flies southwest of Clermont Ferrand, 3,432 feet above the sea, on the right bank of the Dordogne not far from its source. The Monts Dore, from which it takes its name, close the valley toward the south; their culminating peak, Puy de Sancy (6,188 feet), is the highest eminence of central France. The mineral springs of Mont Dore were known to the Romans.

MONTELEONE (usually called Monteleone of Calabria to distinguish it from Monteleone of Apulia in the province of Avellino, which gave its name to the mediæval duchy of the Pignatelli family) is a city of Italy in the province of Catanzaro, on the western side of the Bruttian peninsula, and is beautifully situated on an eminence gently sloping toward the gulf of Sta. Eufemia. It was almost totally destroyed by earthquake in 1783, and for many years afterward consisted mainly of slight wooden erections, but under the French occupation it was made the capital of a province and the headquarters of General Regnier, and it is now a well-built town with a population of 10,000.

MONTÉLIMAR, chief town of an arrondissement and canton in the department of Drôme, France, is situated near the left bank of the Rhone, ninety-three miles south of Lyons on the railway to Marseilles. Population, 12,894.

MONTENEGRO, often pronounced and sometimes written **MONTENERO**, one of the smallest of European countries, lies on the eastern side of the Adriatic, and is bounded by Dalmatia, Herzegovina, Bosnia, and Albania. Previous to 1878 it had an area estimated at 1,669 square miles. The enlargement to about 5,272 square miles proposed by the San Stefano treaty (1878), would probably have swamped the Montenegrin nationality, and the Berlin Congress brought the total area only up to 3,680 miles. Apart from her new maritime district, Montenegro seems little better at first than a chaos of mountains, but on closer examination it appears that there are two distinct groups, an eastern and a western, divided by the Zeta-Moratcha valley. The great mass of the people belong to the Orthodox

Greek Church, only some 7,000 being Roman Catholics, and 3,000 Mahommedans. According to Kaptsevitch, the population was 10,700 in 1838, 120,000 in 1849, 124,000 in 1852, and 170,000 in 1877, but in 1879 it was found that, inclusive of the new territory, the number could not exceed 150,000; since then about 15,000 have been added with Dulcigno. The official returns for 1882 (not based on a census, however) give 236,000 as the total, of whom some 23,000 live in the so-called towns.

Cettinje, with about 2,000 inhabitants, is the capital of the country. Podgoritza (about 6,000 or 7,000 in 1879, since reduced to 4,000) is the principal trading town; it lies at the foot of the mountains, at the junction of the Ruibnitza with the Moratcha, and in Turkish hands was one of the strongest of their fortresses toward Montenegro.

Montenegro is an absolute hereditary monarchy, vested according to the principle of primogeniture in the family of Petrovitch Nyegush. The prince bears the title "Prince of Montenegro and the Berda (mountains)"—Montenegro here meaning the old Montenegrin nahias (provinces) of Katunska, Tzrmitza, Ryetchka, and Lyeshanska, and Berda the territory added in the eighteenth century of the provinces Byelopavlitchska, Piperska, Moratchska, Vasoyevitchska, and Kutska. A responsible ministry was introduced in 1877, and there are now separate departments of justice, foreign affairs, war, and finance and education. The highest administrative body is the council of state, instituted in 1879, and consisting of eight members appointed by the prince. Justice in ordinary cases is rendered in primitive fashion.

MONTEREY, the capital of California up to 1847, is situated on Monterey Bay, 125 miles south from San Francisco by the southern division of the Southern Pacific railroad. Originally founded in 1770 as a mission station and presidio (garrison) by Junipero Serra, it is still in the main a Spanish-looking town, with Spanish talked in its streets and painted on its signboards. At the meeting of the first constitutional convention of California Monterey was a port of entry with a flourishing trade and a promising future; but it soon suffered from the rivalry of San Francisco, and it is now a sleepy place, straggling and dirty, with many of its adobe buildings abandoned to decay.

MONTEREY, a city of Mexico, capital of the state of Nueva Leon, lies on a sub-tributary of the Rio Grande del Norte, 150 miles south-southwest of Nuevo Laredo, and 190 west-southwest of Matamoras. A handsome and well-planned city, with a cathedral and a number of good public buildings, Monterey is also in commercial and manufacturing activity the most important place in the northern parts of the republic, and one of the principal stations on the railway opened in 1882 between the city of Mexico and the United States frontier (at Matamoras and Nuevo Laredo). The population was about 37,000 in 1880. The city was founded in 1596, became a bishopric in 1777, and was captured by the United States forces under General Taylor in September, 1846.

MONTE SAN GIULIANO, a city of Sicily, in the province of Trapani and twelve miles northeast of the town of Trapani, occupies the summit of the mountain from which it takes its name. In the modern town, the population of which has recently decreased to about 3,000 by the migration of considerable numbers to the plain, the chief points of interest are the cathedral, internally restored in 1865, the castle, which occupies the site of the temple, and the three so-called *torri del Bálío*, which probably represent the propylæa.

MONTE SANT' ANGELO, a city of Italy in the province of Foggia (Capitanata), ten miles north of

Manfredonia, stands on an offshoot of Monte Gargano 2,824 feet high. Population (1890), 15,000.

MONTESQUIEU, CHARLES LOUIS DE SECONDAT, BARON, philosophical historian; was born at the chateau of La Brède about ten miles to the southeast of Bordeaux, in January, 1689. Montesquieu was in his youth known as M. de la Brède. His mother died when he was seven years old, and when he was eleven he was sent to the Oratorian school of Juilly, near Meaux, where he stayed five years, and where, as well as afterward at Bordeaux, he was thoroughly educated. The family had long been connected with the law, and Montesquieu was destined for that profession. His father died in 1713, and a year later Montesquieu, or, as he should at this time strictly be called, La Brède, was admitted counselor of the parliament. In little more than another twelvemonth he married Jeanne Lartigue, an heiress and the daughter of a knight of the order of St. Louis, but plain, somewhat ill-educated, and a Protestant. In 1716 his uncle died, leaving him his name, his important judicial office, and his whole fortune. He thus became one of the richest and most influential men in the district. He continued to hold his presidency for twelve years. In the *Lettres Persanes* (1721) Montesquieu not only satirized unmercifully the social, political, ecclesiastical and literary follies of his day in France, but indulged in a great deal of the free writing (so free as very nearly to deserve the term licentious) which was characteristic of the tale-tellers of the time. But what scandalized grave and precise readers naturally attracted the majority, and the *Lettres Persanes* were very popular, passing, it is said, through four editions within the year, besides piracies. It is amusing to find Voltaire describing the *Lettres* as a "trumpery book," a "book which anybody might have written easily." It is not certain that, in its peculiar mixture of light badinage with not merely serious purpose but gentlemanlike moderation, Voltaire could have written it himself, and it is certain that no one else at that time could. The reputation acquired by this book brought Montesquieu much into the literary society of the capital, and he composed for, or at any rate contributed to, one of the coteries of the day the clever but rather rhetorical *Dialogue de Sylla et d'Eucrate*, in which the dictator gives an apology for his conduct.

In 1725 Montesquieu was elected a member of the Academy, but an almost obsolete rule requiring residence in Paris was appealed to, and the election was annulled. In 1726 he sold the life tenure of his office, reserving the reversion for his son, and went to live in the capital, returning, however, for half of each year to La Brède. There was now no further formal obstacle to his reception in the Académie Française, and he was elected and received in January, 1728. Almost immediately afterward he started on a tour through Europe, to observe men, things, and constitutions. He traveled through Austria to Hungary, but was unable to visit Turkey, as he had proposed. Then he made for Italy, where he met Chesterfield. At Venice, and elsewhere in Italy, he remained nearly a year, and then journeyed by way of Piedmont and the Rhine to England. Here he stayed for some eighteen months, and acquired an admiration for English character and polity which never afterward deserted him. He had always been interested in ancient Rome and her history, and he had composed not a few minor tractates on the subject, of which many titles and some examples remain, besides the already mentioned dialogue on Sylla. All these now took form in the *Considérations sur les Causes de la Grandeur et la Décadence des Romains*, which appeared in 1734 at Amsterdam without the

author's name. This, however, was perfectly well known; indeed, Montesquieu formally presented a copy to the French Academy.

But all the time he must have been steadily working at his great book, indeed, a contemporary accuses him of having only gone into society to pick up materials for it. But it seems that he did not begin the final task of composition till 1743. Two years of uninterrupted work at La Brède finished the greater part of it, and two more the rest. It was finally published at Geneva in the autumn of 1748, in two volumes quarto. The publication was, however, preceded by one of those odd incidents which in literature illustrate Clive's well-known saying about courts-martial in war. Montesquieu summoned a committee of friends, according to a very common practice, to hear and give an opinion on his work. It was an imposing and certainly not an unfriendly one, consisting of Hénault, Helvétius, the financier Silhouette, the dramatist Saurin, Crébillon the younger, and lastly, Fontenelle—in fact, all sorts and conditions of literary men. The members of this eminently competent tribunal unanimously, though for different reasons and in different forms of expression, advised the author not to publish a book which has been recently described by a judge of certainly not less competence as "one of the most important books ever written," and which, when importance of matter and excellence of manner are jointly considered, may be almost certainly ranked as the greatest book of the French 18th century.

Montesquieu, of course, did not take his friends' advice. In such cases no man ever does, and in this case it was certainly fortunate. The *Esprit des Lois* represents the reflections of a singularly clear, original, and comprehensive mind, corrected by forty years' study of men and books, arranged in accordance with a long deliberated plan, and couched in language of remarkable freshness and idiosyncrasy. The curious little romance of *Arsace et Isménie*, a short and unfinished treatise on Taste, many of his published *Pensées*, and much unpublished matter date from the period subsequent to the *Esprit des Lois*. He did not, however, live many years after the appearance of his great work. At the end of 1754 he visited Paris. He was shortly after taken ill with an attack of fever, which affected the lungs, and he died on February 10, 1755, aged sixty-six. He was buried in the church of Saint Sulpice with little pomp, and the Revolution obliterated all trace of his remains.

MONTEVERDE, CLAUDIO, the inventor of the "free style" of musical composition, was born at Cremona in 1568, and died in 1643.

MONTEVIDEO, SAN FELIPE Y SANTIAGO DE, the capital of the republic of Uruguay (Banda Oriental) in South America, lies on the eastern side of a nearly semicircular bay on the northern shore of the estuary of the La Plata, 120 miles from Buenos Ayres, with which communication is maintained by a daily service of steamers. The small peninsula on which the city is built does not rise more than ninety-five feet above the level of the sea; but the headland of Cerro, 505 feet high, which forms the western side of the bay, is notable enough on that low-lying coast to justify the name Montevideo; it is crowned by a lighthouse, and by an old Spanish fort, once of considerable strength. About 620 acres is the area occupied by the city proper; the suburbs stretch for miles into the country. As a whole, the city is overbuilt, and immense wealth has been squandered in Italian marbles, and other forms of architectural decoration. The streets are for the most part well paved, and there is an extensive tramway system. Previous to 1870, when water was introduced from a distance of forty miles, the whole supply was dependent on the rainfall. In the old town the principal square is

the Plaza de la Constitucion, the south side of which contains the "cathedral," and the north side the *cabildo* (law-courts, senate-house, and prison). The cathedral is a somewhat imposing building, consecrated October 21, 1804, with a dome and two side towers 133 feet high, which form one of the best landmarks of the bay. In the line of the old ramparts formerly stood the old Spanish citadel, which was built by the seven years' forced labor of 2,000 Guarani Indians. From 1835 to 1868 it served as the principal market in the city; in 1877 it was removed and the area united with the fine Plaza de la Independencia at the southwestern end of Calle del 18 Julio, a broad street which runs in a straight line right through the new town. The new market, covering two acres, was built in 1867, and there are besides the Port market and the Mercado Chico. The Exchange, constructed after the style of the Bourse at Bordeaux, dates from 1864.

Since the beginning of the century the depth of water in the bay has been allowed to diminish five feet, and the area has been reduced by the construction (1868) of an embankment to carry the railway across it. Dredging has been tried from time to time, but on too limited a scale. The so-called harbor is a space of less than half a mile square off the northwest face of the town; in 1870 it was reported to be yearly becoming smaller and less safe, and vessels are now obliged to anchor further out. Among modern improvements in the port the most noteworthy are the Maua dry docks, opened in 1873, and the larger docks, erected in 1877 at a cost of \$2,000,000, at the foot of the Cerro on the other side of the bay. The trade of Montevideo consists mainly in the export of raw products of the slaughter-house (horns, hides, hair, tallow, wool, bones), with a certain quantity of live stock and preserved meat, and in the import of European manufactures. The population is largely of foreign origin, Italian, Spanish, Basque, and French. In 1874 the Italians, who had rapidly increased after the siege, were about 40,000 strong, and in several quarters of the city nothing was to be heard save North-Italian dialects. Even in 1880, after the exodus caused by the confiscations of 1875, they numbered 36,300. The greater proportion are engaged as petty traders. In 1879 the total population of the town was 73,879; it had been 92,260 in 1878, and 105,296 in 1871, and now, including environs, is about 120,000.

MONTEZUMA. See CORTES and MEXICO.

MONTFAUCON, BERNARD DE, critic and scholar, was born at the chateau of Soulage (now Soulatgé, in the department of Aube, France), on January 13, 1655. In 1672 he entered the army, and in the two following years served as a volunteer in Germany under Turenne. But ill-health and the death of his parents brought him back to his studious life, and in 1675 he entered the cloister of the Congregation of St. Maur, at La Daurade, Toulouse, taking the vows there on May 13, 1676. Apart from his vast literary labors, the remainder of his life presents little to record. He died on December 21, 1741.

MONTFORT, SIMON DE, EARL OF LEICESTER, a great political leader, and sometimes referred to as the "founder of the English House of Commons," born in France about the beginning of the thirteenth century, was the fourth and youngest son of Simon IV. de Montfort and of Alice de Montmorency. Of his early life and education nothing is known, the first definitely recorded fact about him being that in April, 1230, he was in England and had attached himself to the service of Henry III., who granted him a temporary pension of 400 marks, with the promise of the earldom which his father had held. Handsome, talented, and brave, he gained the love of Eleanor, widow of the earl of Pem-

broke, and sister of the king, to whom he was privately married at Westminster on January 7, 1238, Henry himself giving away the bride. When the fact became known, the indignation of the baronage and of the people had almost broken out in open rebellion, and, after Simon had with difficulty averted this by propitiating his brother-in-law, Richard, earl of Cornwall, he found it necessary to go to Rome to meet the objections which the church had raised on the ground of an alleged previous vow made by Eleanor. There is some ground for believing that he went to the Holy Land in 1240, and a letter is still extant in which the nobility of the kingdom of Jerusalem ask Frederick II. (June, 1241) to allow Simon de Montfort, earl of Leicester, to act as regent till the arrival of his son Conrad. In 1242 he accompanied Henry's unsuccessful expedition to France. Toward the end of 1252 De Montfort retired into France, where such was the reputation he enjoyed as a statesman that, on the death of the queen-regent and in the absence of Louis IX., he was offered the office of high steward and a place among the guardians of the crown. This, however, he declined, "being unwilling to prove a renegade;" and, after a partial reconciliation with Henry, he returned to England in 1254. In the following year he was sent on a secret mission into Scotland, and in 1257 he was one of the king's ambassadors to France; but his chief activity between 1254 and 1258, if we are to judge by the prominent place he took in the revolution of the last-named year, must have been in the meetings of parliament.

In the early part of 1259 he was chiefly busied with the task of adjusting the terms of a peace with France, which was not settled until the end of that year. From the date of the conclusion of that peace, owing to divisions in the reforming party, the king began to regain his lost power, and in 1262 he felt himself strong enough to repudiate the Provisions of Oxford, thus giving the signal for civil war. The successes of the barons, led by De Montfort, in the west, and his victorious entry into London again reduced the king to submission, but only to bring once more also into prominence the divided state of Leicester's supporters. Louis' one-sided Mise of Amiens (1264), however, rendered another appeal to arms on the part of the barons inevitable, and by the victory of Lewes (May 14, 1264) De Montfort for the time became master of England. Taking Henry, his prisoner, along with him to London, he summoned thither the parliament, which met in June, and drew up the constitution or scheme of government associated with his name, of which the most striking feature is the new development it gives to the representative system. A still further advance in the development took place in 1265, when borough members, as distinguished from county members, were for the first time summoned. Meanwhile troubles in the west required De Montfort's presence in the field, and, by the alliance of his rival Gloucester with Roger Mortimer, as well as by the escape of Prince Edward, who put himself at the head of the royalist opposition, the great parliamentary leader was placed in serious straits. At Evesham, where he had halted on his march to join his son at Kenilworth, he was surprised by the army of Prince Edward, and after a struggle of about two hours was slain on the field of battle (August 4, 1265).

MONTGOMERY, an inland county of Wales. Its greatest length from southeast to northwest is about forty miles, and its breadth from east to west, about thirty-five miles. The area is 495,089 acres, or about 773 square miles.

MONTGOMERY, the county town, is situated on the declivity of a well-wooded hill near the eastern bank of the Severn. Population, 1,200.

MONTGOMERY, a district in the lieutenant-governorship of the Punjab, with an area of 5,573 square miles.

MONTGOMERY, the county seat of Montgomery county and capital of the State of Alabama, stands on the left bank of the Alabama river, on a pleasant, hilly site, 175 feet above sea-level. It is 158 miles northeast of Mobile, and has steamboat connections with that city and the Gulf of Mexico. Six railway lines pass through or have their termini in Montgomery, thus making it the receiving and distributing center for a large section of productive country. The city was founded in 1817, and was named after Gen. Richard Montgomery, who was killed at Quebec in 1775. In 1847 the State capital was transferred from Tuscaloosa to Montgomery, where a State capitol, one of the handsomest in the South, was erected for the accommodation of the executive and legislature. Other important buildings are the Federal offices and postoffice, the Masonic temple, two fine theaters, and thirteen hotels. There are two national and five other banks. The city has a first-class fire department, maintained at an expense (1889) of \$10,192. The police department consists of twenty-six officers and men, and cost \$24,037 in 1889. The city has grown very rapidly since the war, and now has a population (1890) of 21,883. Its bonded debt is \$722,050; annual receipts for 1889 were \$336,424, expenditures during same period, \$267,789. There is a good public-school system, with an appropriation last year of \$20,410, and expenditures of \$17,417. There are five schools, three for whites and two for blacks, with an enrollment of 992 white and 543 colored pupils. Pickett Springs Park, four miles from the court-house, is the principal park, and there is a handsome city cemetery.

Montgomery is notable in history as the city in which on February 4, 1861, delegates of the seceding States met to organize the Confederacy. Howell Cobb presided, and on the 9th the convention organized a Provisional Government under the title of "the Confederate States of America." Jefferson Davis, of Mississippi, and Alexander H. Stephens, of Georgia, were respectively elected Provisional President and Vice-President of the newly-constituted government. Montgomery became the capital of the Confederacy, and so remained until the seat of government was transferred to Richmond, Va.

MONTGOMERY, ALEXANDER, whose life fell between 1550 and 1610, was the last of the series of Scottish poets who flourished in the sixteenth century under the patronage of the Jameses.

MONTGOMERY, JAMES, poet and journalist, was justly described by Lord Byron, in a footnote to *English Bards and Scotch Reviewers*, as "a man of considerable genius," though it was going far beyond the mark to speak of his *Wanderer of Switzerland* (his first notable poem, published in 1806) as being worth a thousand "Lyrical Ballads." Montgomery was born November 4, 1771, at Irvine in Ayrshire, Scotland. Part of his boyhood was spent in Ireland, but he received his education in Yorkshire, at the Moravian school of Fulneck, named after the original home of the Moravians, to which sect his father belonged. He drifted at an early age into journalism, and edited the *Sheffield Iris* for more than thirty years. When he began his career the position of a Dissenting journalist was a difficult one, and he twice suffered imprisonment (in 1795 and 1796) on charges that now seem absurdly forced and unfair. His *Wanderer* was mercilessly ridiculed by the *Edinburgh Review*, but in spite of this Montgomery published many widely popular poems. He died in 1854.

MONTGOMERY, ROBERT, author of *The Omnipresence of the Deity* (1828), *Satan* (1830), and *The*

Messiah (1832) was the Montgomery ridiculed and denounced in Macaulay's famous essay. As a poet he deserved the censure. He was born 1807; died, 1855.

MONTH. See ASTRONOMY and CALENDAR.

MONTILLA, a small and unimportant town of Spain in the province of Cordova, thirty-two miles to the south of the city of Cordova. Population (1890), 14,000.

MONTLUC, BLAISE DE LASSERAN-MASSENCOME, SEIGNEUR DE, marshal of France, was born about 1503. His chief feat was the famous defense of Siena (1555), which he has told so admirably. When the religious wars broke out in France, Montluc, a staunch royalist, held Guienne for the king, and exercised severe but impartial justice on Catholics and Protestants alike. He would have nothing to do with the Massacre of St. Bartholomew. Henry III., however, made him marshal of France, an honor which he had earned by nearly half a century of service and by numerous wounds. He died at Estillac near Agen in 1577.

MONTLUÇON, the industrial capital of the center of France, sometimes called the French Manchester, is the head of an arrondissement, and the largest town (26,079 inhabitants) of the department of Allier.

MONTMORENCY, the name of one of the oldest and most distinguished families in France, is derived from Montmorency, now in the department of Seine-et-Oise, in the immediate neighborhood of Enghien and St. Denis, and about nine miles to the north-northwest of Paris. The family, since its first appearance in history in the person of BOUCHARD or BURCHARD I., sire de Montmorency in the tenth century, has furnished six constables and twelve marshals of France, several admirals and cardinals, numerous grand officers of the crown and grand masters of various knightly orders, and was declared by Henry IV. to be, after that of the Bourbons, the first house in Europe. ANNE de Montmorency, so named, it is said, after his godmother Anne of Brittany, was the first to attain the ducal title. He was born at Chantilly in 1493, and was brought up with the dauphin, afterward Francis I., whom he followed into Italy in 1515, distinguishing himself especially at Marignano. In 1516 he became governor of Novara; in 1520 he was present at the Field of Cloth of Gold, and afterward had charge of important negotiations in England. He was made marshal of France in 1522, accompanied Francis into Italy in 1524, and was taken prisoner at Pavia in 1525. In 1538, on the ratification of the ten years' truce, he was rewarded with the office of constable, but in 1541 he fell into disgrace, and did not return to public life until the accession of Henry II. in 1547. In 1548 he repressed the insurrections in the southwest, particularly at Bordeaux, with great severity, and in 1549-1550 conducted the war in the Boulonnais, negotiating the treaty for the surrender of Boulogne on March 24, 1550. In 1551 his barony was erected into a duchy. Soon afterward his armies found employment in the northeast in connection with the seizure of Metz, Toul, and Verdun by the French king. His attempt to relieve St. Quentin issued in his defeat and captivity (August 10, 1557), and he did not regain his liberty until the peace of Cateau-Cambrésis in 1559. On the accession of Charles IX. in 1560 he resumed his offices and dignities, and, uniting with his former enemies, the Guises, played an important part in the Huguenot war of 1562. Though the arms of his party were victorious at Dreux, he himself fell into the hands of the enemy, and was not liberated until the treaty of Amboise (March 19, 1563). In 1567 he again triumphed at St. Denis, but received the death-blow of which he died soon afterward at Paris. His eldest son, FRANÇOISE de Montmorency (1530-1579), was married to

Diana, natural daughter of Henry II.; another son, HENRI I. de Montmorency (1534-1614), was constable of France from 1593. HENRY II. (1595-1632), son of duke Henry I., succeeded to the title in 1614, having previously been raised by Louis XIII. to the office of grand admiral. In 1632 he joined the party of Gaston, duke of Orleans, and placed himself at the head of the rebel army, which was defeated by Marshal Schomberg at Castelnaudary (September 1, 1632); severely wounded, he fell into the enemy's hands, and, abandoned by Gaston, was executed as a traitor at Toulouse on October 30th. The title passed to his sister CHARLOTTE-MARGUERITE, princess of Condé.

MONTORO, a town of Spain, in the province of Cordova, twenty-seven miles to the north-northeast of that city, on the Madrid railway, stands on a rocky peninsula on the south bank of the Guadalquivir. The population of the ayuntamiento is 15,000.

MONTPELIER, the capital of Vermont (since 1805), and the county seat of Washington county (since 1811), is situated on the Winooski or Onion river, which falls into Lake Champlain. The State-house, in the form of a Greek cross with a dome and Doric portico, was erected at a cost of \$150,000, to replace the structure burned down in 1857. Under the portico stands a marble statue (by Larkin G. Mead) of Ethan Allen (1737-1789), the hero of Vermont. The State library contains 20,000 volumes. From 2,411 in 1860 the population has increased to 3,500.

MONTPELLIER, chief town of the department of Hérault, France, is situated at the junction of several railway lines, on a small hill rising above the Lez, at its confluence with the Merdanson, about 480 miles south of Paris, and about seven miles from the Mediterranean. Population (1890), 60,000.

MONTPENSIER, ANNE MARIE LOUISE D'ORLÉANS, DUCHESSE DE, was born at the Louvre on May 29, 1627. Her father was Gaston of Orleans, "Monsieur," the brother of Louis XIII., celebrated for the invariable ill fate which attended his favorites and partisans. Her mother was Marie de Bourbon, heiress of the Montpensier family. It was, perhaps, the greatest misfortune of her life that "Mademoiselle" (as her courtesy title went) was encouraged, or thought herself encouraged, to look forward to the throne of France as the result of a marriage with Louis XIV., who was, however, eleven years her junior. Ill-luck, or her own willfulness, frustrated numerous plans for marrying her to various persons of more or less exalted station, including Charles II. of England, then Prince of Wales. She was nearly forty, and had already corresponded seriously with Madame de Motteville on the project of establishing a ladies' society "sans mariage et sans amour," when a young Gascon gentleman named Puyguilhem, afterward celebrated as M. de Lauzun, attracted her attention. It was some years before the affair came to a crisis, but at last, in 1670, Mademoiselle solemnly demanded the king's permission to marry Lauzun. Lauzun was imprisoned in Pignerol, and it was years before Mademoiselle was able to buy his release from the king by settling no small portion of her estates on Louis' bastards. The elderly lovers (for in 1681, when Lauzun was released, he was nearly fifty, and Mademoiselle was fifty-four) were then secretly married, if indeed they had not gone through the ceremony ten years previously. But Lauzun, a coarse and brutal adventurer, tyrannized over his wife, and her spirit, which was yet unbroken, at length got the better of her passion. It is said that on one occasion he addressed her thus, "Louise d'Orléans, tire-mois mes bottes," and that she at once and finally separated from him. She lived, however, for

some years after he had achieved his last adventure (that of assisting the family of James II. to escape from England, and attempting to defend their cause in Ireland), gave herself to religious duties, and finished her *Mémoires*, which extend to within seven years of her death (April 9, 1693), and which she had begun when she was in disgrace thirty years earlier.

MONTREAL, the largest city in the Dominion of Canada, its chief seat of commerce and principal port of entry, is situated on an island of about thirty miles in length and seven in breadth, at the confluence of the rivers Ottawa and St. Lawrence. It stands at the head of ocean navigation, 160 miles above Quebec, and nearly 1,000 miles (986) from the Atlantic Ocean, and lies at the foot of the great chain of river, lake, and canal navigation which extends westward through the great lakes. Montreal is built upon a series of terraces, the former levels of the river or of a more ancient sea. Behind those rises Mount Royal, a mass of trap-rock thrown up through the surrounding limestone strata to a height of 700 feet above the level of the river. From this rock the city derives its name, though its original founder, Paul de Chomedey, sire de Maisonneuve, in 1642, gave it the name of Ville-Marie. The modern city of Montreal occupies an area of about eight square miles—its principal streets running parallel with the river. On the north side of the mountain the Trenton limestone approaches the surface, and is there quarried for building purposes. Of this gray limestone most of the public edifices and many of the better class of private dwellings are built. The western slope of the mountain is occupied by the Côte des Neiges (Roman Catholic) cemetery, and the Mount Royal (Protestant) cemetery. The upper portion of the mountain, embracing an area of 430 acres, is now laid out as a public park, with fine drives, shaded by well-grown trees. On the east side the city occupies the slope toward the river St. Lawrence, which has here a breadth of from one to two miles. Two islands, the Nun's and St. Helen's Isles, the latter rising to a height of 150 feet, beautifully wooded, and laid out as a public park—occupy the bed of the river immediately below the Lachine Falls, and between them the river is spanned by the great Victoria Bridge. This is a tubular iron bridge supported on twenty-four piers of solid masonry, with the terminal abutments of the same, and measuring 9,184 feet in length. The river descends at the rate of seven miles an hour at the point where it is thus crossed; and the piers are constructed with a view to resist the enormous pressure of the ice in spring. The wharves and docks are crowded with shipping during the season of navigation, for the St. Lawrence is navigable to Montreal by the largest ocean steamers. But immediately above the city the river is impeded by a natural dyke of trap and limestone which here arrests the waters in their descent, forming the Lake St. Louis at a height of forty-four feet above the level of Montreal harbor. The river here forces its way through a channel of about half a mile wide, with a rapidity of about eighteen miles an hour, forming the Lachine or St. Louis rapids. Owing to the immense volume of water concentrated in a narrow channel, steamers drawing ten feet of water are safely navigated down the rapids, but these necessarily present an insuperable barrier to the ascent of the river. This is accordingly surmounted by means of the Lachine Canal which, commencing at the port of Montreal, passes round the falls by a series of locks, in a course of nine miles to Lake St. Louis, opposite the Indian village of Caughnawaga. The fall of water in the canal furnishes water-power for saw-mills, boiler and engine works, sash, blind, door, edge-tool, and other factories, established on its banks. Sugar-refining has also been carried on

here with great profit. Woolen and cotton mills, silk factories, a large rubber factory, rope and cordage works, boot and shoe factories, etc., are likewise organized on an extensive scale. The water supply of Montreal is derived from the river above the city; and, after passing along an open canal five miles in length, it is raised to a reservoir excavated out of the solid rock on the east slope of the Mountain, 205 feet above the level of the harbor.

The circumstances attendant on the foundation of Montreal, and the marked contrasts in its mixed population of French and English, give a peculiar character to its religious and benevolent institutions. This has led to the multiplication of churches, colleges, convents, and religious and charitable foundations, and to a rivalry in the zeal of their promoters, one result of which is seen in the scale and imposing character of many of their buildings. The Metropolitan Cathedral of St. Peter, designed to reproduce on a reduced scale the chief features of St. Peter's at Rome, was projected by Bishop Bourget after the destruction of his church and palace in the great fire of 1852. It occupies a prominent site in Dorchester street, at the corner of Dominion Square. The parish church of Notre-Dame, on the Place d'Armes, affords accommodation for 10,000 worshippers. The Jesuits' Church is another large church, elaborately painted in the interior. Near it is the College of St. Mary. Christchurch Cathedral (Protestant) is a fine specimen of Decorated Gothic, built, externally, of the native limestone, but with the chief facings and carvings of the exterior and the whole of the interior of fine Caen stone.

The Hôtel Dieu, founded in 1644 for the cure of the sick, now occupies a building at the head of St. Famille street. The order of the Grey Nuns, founded in 1737, have built a new hospital in Guy street. The professed sisters of this religious community, numbering at present 310, receive under their care the aged and infirm, and the orphan and foundling children of the French Canadian population. They also undertake the care of various asylums and schools in different parts of the city. Montreal has also a General Hospital, founded in 1822; a Protestant House of Industry, the Mackay Institution for Deaf-Mutes, the Protestant Orphan Asylum, Infants' Home, etc. The curiously mixed character of the population of Montreal is further shown in its separate daily and weekly newspapers in the English and French languages, and in its various national societies, of St. George, St. Andrew, St. Patrick, St. Jean Baptiste, and New England—each confining its charitable operations to those of the nationality which it represents. There are two theaters in Montreal.

Among the chief civic buildings is the city hall, built in the modern French style, with lofty mansard roofs, and a central pavilion.

Foremost among the educational institutions is the university of M'Gill College, founded by James M'Gill, a Scotchman, who in the later years of the eighteenth century engaged in the northwest fur trade, and ultimately became one of the leading merchants in Montreal. At his death, in 1813, he left his property for the founding of a college. The most recent and liberal addition to it is the Peter Redpath Museum, valued at upward of \$100,000, the gift of a wealthy citizen. The university embraces the faculties of arts, law, and medicine, and has also a department of practical science. The Seminary of St. Sulpice is a theological training school for priests, where the larger portion of the Roman Catholic clergy of the province of Quebec have received their training, and also a college where a large number of the French Canadian youth receive their education. This seminary is held in high esteem, and attracts many

Roman Catholic students from the United States. Laval University, which has its chief seat at Quebec, has also a branch at Montreal, with a large staff of professors, chiefly in theology, law, and medicine. The M'Gill and the Jacques Cartier Normal Schools for training teachers for the Protestant and Roman Catholic public schools are conducted under the Protestant and Roman Catholic boards of public instruction; and model schools attached to them afford the requisite practical training for teachers.

The commerce of Montreal is well represented by the architectural character of its banking establishments and many of the large mercantile houses. It is also the seat of a large manufacturing industry. But the most substantial evidence of its importance as a commercial center is its harbor. The solidly-built basins, wharves, quays, and canal locks extend for upward of a mile and a half along the river side. Direct grain exports in 1889 equaled 9,843,175 bushels; an increase of over 4,000,000 bushels over 1888. The harbor revenues in 1889 were \$249,189. The receipts of grain, flour and meal in 1889 were 18,722,865 bushels. The business of the port is thus expressed in Canadian currency: total value of exports \$32,638,270; of imports, \$47,191,888; customs duties collected, \$9,321,981. The number of sea-going vessels in port was 695, of which fully one-half were ocean steamers. The estimated value of real estate in Montreal is \$65,978,930. The population in 1851 numbered 57,715; in 1881 it had increased to 140,747, and is now (1891) 220,000.

The city returns three members to the Canadian House of Commons, and the same number to the provincial legislature of Quebec.

When the first French explorers landed on the island of Montreal under the leadership of Jacques Cartier in 1535, a large Indian palisaded town existed a little to the west of Mount Royal, and not far from the present English cathedral. To this fortified town the Indians gave the name of Hochelaga, and Jacques Cartier describes it as surrounded by fields of grain and other evidences of a settled native population. The name is now applied to the eastern suburb of the modern city. The early history of Montreal is largely occupied with incidents of Indian warfare. In 1665 the marquis de Tracy arrived from France, bringing with him a regiment of French soldiers, with whose aid the Indian assailants were driven off, and forts erected and garrisoned to repel their incursions; thus protected, Montreal became the center of the fur trade with the west, and entered on its history as a commercial city. In 1722 it was fortified with a bastioned wall and ditch, under the directions of De Lery; and the citadel was erected on a height now laid out as Dalhousie Square. The taking of Quebec by the English under General Wolfe in 1759 was followed ere long by the surrender of Montreal. Since that date it has rapidly developed as an important center of commercial and manufacturing enterprise.

MONTROSE, a royal and parliamentary borough and seaport of Forfarshire, Scotland. Population (1890), 16,000.

MONTROSE, JAMES GRAHAM, MARQUIS OF, born in 1612, became the fifth earl of Montrose by his father's death in 1626. He was educated at St. Andrews; and in 1629, at the early age of seventeen, he married Magdalene Carnegie, daughter of the earl of Southesk. In 1636, on his way home from a prolonged visit to the Continent, he sought an introduction to Charles I., but, as it is said, was frustrated in his hope of obtaining the king's favor by an intrigue of the marquis of Hamilton. Not long after the outbreak of the Scottish troubles in 1637 he joined the party of resistance, and was for some time its most energetic champion. He signed the

Covenant, and became one of the foremost Covenanters. The part assigned to him was the suppression of the opposition to the popular cause which arose around Aberdeen and in the country of the Gordons. Three times, in July, 1638, and in March and June, 1639, Montrose entered Aberdeen, where he thoroughly succeeded in effecting his object, on the second occasion carrying off the head of the Gordons, the marquis of Huntly, as a prisoner to Edinburgh.

In July, 1639, after the signature of the treaty of Berwick, Montrose was one of the Covenanting leaders who visited Charles upon the borders. After the invasion of England had been crowned with success, Montrose still continued to cherish his now hopeless policy. On May 27, 1641, he was summoned before the Committee of Estates charged with intrigues against Argyll, and on June 11th he was imprisoned in Edinburgh Castle. When Charles visited Scotland to give his formal assent to the abolition of Episcopacy, Montrose communicated to him his belief that Hamilton was a traitor.

For a time Montrose retired, not voluntarily, from public life. After the Civil War in England began he constantly pressed Charles to allow him to make a diversion on Scotland. At last in 1644, when the Scottish army entered England to take part against the king, Montrose, now created a marquis, was allowed to try what he could do. He set out to invade Scotland with about 1,000 men. But his followers deserted, and his position appeared hopeless. Montrose did not miscalculate his chances. The clans rallied to his summons. About 2,000 Irish crossed the sea to assist him. He won battle after battle. He defeated the Covenanters at Tippermuir on September 1st, and at the Bridge of Dee on September 12th. The Scottish parliament declared Montrose to have forfeited his life and estate as a traitor, but it could not reach him to execute the sentence. In the name of the king, who now appointed him lord-lieutenant and captain-general of Scotland, he summoned a parliament to meet at Glasgow on October 20th, in which he no doubt hoped to reconcile loyal obedience to the king with the establishment of a non-political Presbyterian clergy. That parliament never met. In England Charles was in evil plight. He had been defeated at Naseby on June 14th, and Montrose must come to his help if there was to be still a king to proclaim. He never had a chance of knowing what Montrose could do against the "new model" army. David Leslie, the best of the Scottish generals, was dispatched against Montrose to anticipate the invasion. On September 12th he came upon Montrose, deserted by his Highlanders, and guarded only by a little group of followers at Philiphaugh. He won an easy victory. Montrose cut his way through to the Highlands; but he failed to reorganize an army. On September 3, 1646, he embarked for Norway.

Montrose was to appear once more on the stage of Scottish history. In June, 1649, he was restored by the exiled Charles II. to his nominal lieutenant-governorship of Scotland. In March, 1650, he landed in the Orkneys to take the command of a small force which he had sent on before him. Crossing to the mainland, he tried to raise the clans, but the clans would not rise, and on April 27th he was surprised and captured at Corbiesdale in Ross-shire. On May 18th he entered Edinburgh as a prisoner. On the 20th he was sentenced to death by the parliament, and he was hanged on the 21st.

MONT ST. MICHEL, a curious rocky islet, consisting of a mass of granite about 3,000 feet in compass and 165 feet in height, rises at a distance of nearly a mile from the shore in the bay of St. Michel, near the mouth of the Couësnon, at the vertex of the angle formed by the

coasts of Brittany and Normandy. The quicksands by which it is surrounded, and which stretch far to seaward, are exposed at low water, and highly dangerous to those who venture on them without a guide.

MONTSERRAT, one of the Leeward Islands in the West Indies, is twelve miles long and eight broad in its widest part, and has an area of thirty-two square miles. The island was discovered by Columbus in 1493, and received its name either because of its broken appearance or after the mountain in Spain. It was colonized by the English under Sir Thomas Warner in 1632, and was taken by the French in 1664. Restored to the English in 1668, it capitulated to the French in 1782, but was again restored in 1784. It is now a presidency under the general government at Antigua, and has a legislative council, composed of officials and crown nominees. The population (10,087) consists principally of negroes, with several hundred whites.

MONTSERRAT. Thirty miles to the northwest of Barcelona, in Spain, there rises a very remarkable mountain of gray conglomerate, twenty-four miles in circumference, and at its loftiest point (San Geronimo) a little more than 4,000 feet in height. The mountain consists of jagged pinnacles and spires rising abruptly from the base of the mass, which is cloven with many clefts, and abounds with steep precipices. It is the *Mons Serratus* of the Romans, the *Monte Serrado* of the Spaniards, and is thus named, either in allusion to its jagged appearance, like the teeth of a saw, or because the eastern face is split, as if sawn—which occurred, say the Spanish legends, at the time of the crucifixion, when the rocks were rent. The arms of the monastery represent a mountain with a saw resting upon it and penetrating some distance into its mass.

MONTUCLA, JEAN-ÉTIENNE, a learned mathematician, was born at Lyons in 1725, and died in 1799.

MONZA (locally Monscia), a city of Italy in the province of Milan, at the branching of the railway for Lecco and Como, lies on the Lambro, a tributary of the Po. Population (1890), 16,000.

MOOLTAN. See MÚLTÁN.

MOON, THE. The subject of the moon divides itself into two separate branches, the one concerned with the constitution of the lunar globe, the other with its motions. For the first subject the reader is referred to the article ASTRONOMY; the present article is confined to the second, which is commonly called the *Lunar Theory*.

The lunar theory does not yet form a well-defined body of reasoning and doctrine, like other branches of mathematical science, but consists only of a series of researches, extending through twenty centuries or more, and incapable of being welded into a consistent whole. This state of things arises from the inherent difficulties and complexities of the subject, and from the fact that no one method or system has yet been discovered by which all the difficulties can be surmounted and all the complexities disentangled. Hence each investigator, when he has desired to make any substantial advance beyond his predecessors, has been obliged to take up the subject from a new point of view, and to devise such method as might seem to him most suitable to the special object in hand. The historical treatment is therefore that best adapted to give a clear idea of the results of these investigations. The ancient and modern histories of the subject are quite distinct, the modern epoch commencing with Newton. The great epoch made by Copernicus did not extend to the case of the moon at all, because in every investigation of the moon's motion, modern as well as ancient, the motion is referred to the earth as a center. Hence the heliocentric system introduced no new conception of

this motion, except that of taking place round a moving earth instead of round a fixed one. This change did not affect the consideration of the relative motion of the earth and moon, with which alone the lunar theory is concerned. The two stages of the lunar theory are, therefore, that in which the treatment was purely empirical, and that in which it was founded rationally on the law of gravitation.

It is in the investigation of the moon's motion that the merits of ancient astronomy are seen to the best advantage. In the hands of Hipparchus the theory was brought to a degree of precision which is really marvelous when we compare it, either with other branches of physical science in that age, or with the remarks and speculations of contemporary non-scientific writers. Whether this was wholly the work of Hipparchus, or whether he simply perfected a system already devised by his predecessors, it is now impossible to say; but, so far as certain knowledge extends, the works of his predecessors did not embrace more than the determination of the mean motion of the moon and its nodes. Although the general fact of a varying motion may have been ascertained, the circumstances of the variation had probably never been thoroughly investigated.

The modern lunar theory commenced with Newton, and consists in determining the motion of the moon deductively from the theory of gravitation. But the great founder of modern mechanics did not employ the method best adapted to lead to the desired result, and hence his efforts to construct a lunar theory are of more interest as illustrations of his wonderful power and correctness in mathematical reasoning than as germs of new methods of research. He succeeded perfectly in explaining the elliptic motion of two mutually attracting bodies round their common center of gravity by geometrical constructions. But when the problem was one of determining the variations from the elliptic motion which would be produced by a third body, such constructions could lead only to approximate results. The path to modern methods was opened up by the Continental mathematicians, whose great work consisted in reducing the problem to one of pure algebra.

In the researches on the lunar theory before Delaunay the principal force was taken to be the attraction of the earth upon the moon, and the disturbing force was that due to the sun's attraction. When the action of the earth alone was included the moon would move in an ellipse, in accordance with Kepler's laws. The effect of the sun's action could be allowed for by supposing this ellipse to be movable and variable. But when it was required to express this variation the problem became excessively complicated, owing to the great number of terms required to express the sun's disturbing force. Now, instead of passing from the elliptic to the disturbed motion by one single difficult step, Delaunay effected the passage by a great number of easy steps. Out of several hundred periodic terms, the sum of which expressed the disturbing force of the sun, he first took one only, and determined the variations of the Keplerian ellipse on the supposition that this term was the only one. In the solution the variable elements of the ellipse would be expressed in terms of six new constants. He then showed how these new constants could be taken as variables instead of the elements of the original ellipse. Taking a second term of the disturbing force, he expressed the new constants in terms of a third set of constants, and so repeated the process until all the terms of the disturbing force were disposed of.

MOORCROFT, WILLIAM, traveler in Asia, was born in Lancashire, England, about 1770 and died in 1825.

MOORE, EDWARD, minor poet, was the son of a dissenting minister of Abingdon, where he was born in 1712. He was the author of the thrilling domestic tragedy of *The Gamester*, originally produced in 1753 with Garrick in the leading character, and still in the repertory of acting plays. Moore also wrote two comedies. As a poet he produced clever imitations of Gay and Gray, and with the assistance of Lyttelton, Chesterfield, and Horace Walpole conducted *The World* (1753-57) during the great decade of the revival of periodical essay-writing. *The World* followed Johnson's *Rambler*, and was followed by *The Idler*; it had as rivals *The Adventurer* and *The Connoisseur*. Moore died at London in 1757.

MOORE, DR. JOHN, born at Stirling in 1730, was one of the most prominent writers of travels and novels in the latter part of the eighteenth century. His novel *Zeluco* (published in 1789) produced a powerful impression at the time, and indirectly, through the poetry of Byron, has left an abiding mark on literature. He was a doctor by profession, and the son of a Stirlingshire clergyman. After taking his medical degree at Glasgow, he served with the army in Flanders, then was attached to the household of the English ambassador at Paris, then practiced for five years in Glasgow, next traveled on the Continent for five years with a young nobleman, settled for some years as a physician in London, accompanied Lord Lauderdale to Paris in 1792 and witnessed some of the principal scenes of the Revolution. He died at London in 1802.

MOORE, SIR JOHN, the only English general who has gained lasting fame by the conduct of a retreat, was the son of Doctor Moore (the subject of the preceding notice), and was born at Glasgow, November 13, 1761. In 1788 he was promoted to a majority in the fifty-first regiment, and in 1790 he became lieutenant-colonel and resigned his seat in parliament. In the Irish rebellion of 1798 he distinguished himself by his activity in saving Wexford from destruction after the battle of Vinegar Hill. His services were in universal request, and Abercromby insisted upon his serving with him in the expedition to the Helder in 1799, where he did creditably all that was creditably done in that ill-managed expedition. On his return from Holland he was made colonel of the fifty-second regiment, and in 1800 accompanied Abercromby to the Mediterranean as major-general.

In May, 1808, he was ordered with a force of 11,000 men to Sweden to assist the king against the united forces of France and Russia. The mad conduct of the Swedish king, however, who even went so far as to declare Sir John Moore under arrest when he refused to acquiesce in his plans, ruined any chance of successful coöperation, and the English general made his escape and returned to England. He was at once ordered to proceed with his division to Portugal, where Sir Arthur Wellesley had already landed.

Now began the glorious three months on which Moore's reputation as a soldier and a statesman must rest. The Spaniards, flushed with their former success at Baylen, regarded Napoleon, who had in person crossed the Pyrenees, as another Dupont, and loudly summoned Moore to a share in their coming victories. Moore knew better what was the value of Napoleon's genius, but he had been commanded to assist the Spaniards, and therefore gave the order to advance. His army marched in four distinct divisions, and on November 13, 1808, he concentrated at Salamanca, where he waited to see what would happen. He heard that a subsidiary force under Sir David Baird had arrived at Coruña, and ordered it up to join him. Having once drawn Napoleon's attention to himself, he began his famous retreat and fell back quickly, fighting

every day and invariably with success. To detail each step of the retreat and every skirmish would be but to rewrite Napier; suffice it to say that, with great loss of life and material, Moore reached Coruña on January 12, 1809. But the fleet to take the army home was not there; and the English would have to fight Soult, whose army was even more weakened and demoralized than Moore's, before they could embark. It was on January 16th that Moore fought his last battle; he fell early in the day, and knew at once that his wound was mortal.

MOORE, THOMAS, born at Dublin on May 28, 1779, fairly shares with Lord Byron the honor of being the most popular poet of his generation. Whatever may be thought now of the intrinsic qualities of his verse, this much cannot be denied. Much of Moore's success was due to his personal charm. This at least gave him the start on his road to popularity. There is not a more extraordinary incident in the history of our literature than the instantaneousness with which the son of a humble Dublin grocer, on his first visit to London, captivated the fashionable world and established himself in the course of a few months as one of its prime favorites. Before he left school he had acquired fame in his own circle as a song-writer, and had published, in the *Anthologia Hibernica*, verses "to Zelia on her charging the author with writing too much on love." This was in 1793. In that year the prohibition against Catholics entering Trinity College was removed, and next year Moore took advantage of the new freedom. As one of the first Catholic entrants, he had an exceptional stimulus to work, and there industriously acquired that classical scholarship with which he won the hearts of such learned Whigs as Lansdowne and Holland, while he charmed fashionable ladies with the grace of his songs.

Moore was fairly established in London society in the first year of the century, and from that time the hope of its applause was the ruling aspiration of his life and its judgment the standard of his work. Through Lord Moira's influence he was appointed registrar of the admiralty court in Bermuda, in 1803. He went there to take possession, but four or five months of West India society, jingling pianofortes, and dusky beauties bored him excessively, and he appointed a deputy and returned to London, after little more than a year's absence. The office continued to bring him about £400 a year for fourteen or fifteen years, but at the end of that time embezzlement by the deputy, for whom he was responsible, involved him in serious embarrassment. This was all that Moore received from his great political friends—no great boon as things went in the days of patronage. The poet's long-deferred hopes were finally extinguished in 1812, when Lord Moira, under the Liverpool administration, went out as governor-general to India without making any provision for him. From that time Moore set himself in earnest to make a living by literature, his responsibilities being increased by his marriage in 1811. From his boyhood to 1812 may be called the first period of Moore's poetical activity. He had formed the design of translating Anacreon while still at college, and several of the pieces published in 1801 under the *nom de plume* of "Thomas Little" were written before he was eighteen. "Little's" songs at once became the rage in every drawing-room. He found his songs in Virginia when he landed there on his way to Bermuda. And not only were his songs sung, but his poems were read, passing rapidly through many editions.

His publication of 1806 was savagely reviewed in the *Edinburgh* by Jeffrey, who accused him of a deliberate design to corrupt the minds of innocent maidens with his wanton fancies, and who had in consequence to

figure in a ludicrous attempt at a duel—ludicrous in its circumstances, though Moore was ferociously in earnest. We may well acquit Moore of the diabolic intention attributed to him, but Jeffrey's criticism of his poetry as poetry was just enough. The only parts of the volume that Jeffrey praised were the satirical epistles. The vein essayed in these epistles Moore pursued afterward in his *Corruption*, *Intolerance* (1808), and *The Sceptic*, a philosophical satire (1809), but as long as he kept to the heroic couplet and the manner of Pope he could not give full scope to his peculiar powers as a satirist. Of all the poetical enterprises that Moore undertook, none was so exactly suited to his powers as the task proposed to him by the publisher Power of supplying fit words to a collection of Irish melodies. The first number appeared in 1807, and it was so successful that for twenty-seven years afterward writing words to music was one of Moore's most regular occupations and his steadiest source of income, Power paying him an annuity of £500. Six numbers of Irish melodies were published before 1815; then they turned to sacred songs and national airs, issuing also four more numbers of Irish melodies before 1834. Moore entered into this work with his best and most practiced powers and with all his heart. From his boyhood he had been in training for it.

The regent's desertion of the Whigs in 1812 cut them off from all hope of office for many years to come, and Moore from his last hope of a snug sinecure, when Lord Moira also was practically oblivious of him. There was at once a marked increase in his literary fertility, and he broke ground in a new field, which he cultivated with preëminent success—political squib-writing. Moore was incapable of anything like rancor, but he felt the disappointment of his hopes enough to quicken his fancy and sharpen the edge of his wit. Moore opened fire in the *Morning Chronicle*, and crowned his success next year (1813) with a thin volume of "Intercepted Letters," *The Twopenny Post Bag*. A very little knowledge of the gossip of the time enables us to understand the delight with which Moore's sallies were received in the year which witnessed the imprisonment of Leigh Hunt for more outspoken attacks on the regent. Moore received every encouragement to work the new vein. He was at one time in receipt of a regular salary from the *Times*; and his little volumes of squibs published at intervals—*The Fudge Family in Paris*, 1818; *The Journal of a Member of the Pococurante Society*, 1820; *Fables for the Holy Alliance*, 1823; *Odes on Cash, Corn, Catholics, and other Matters*, 1828; *The Fudges in England*, 1835—went through many editions. The prose *Memoirs of Captain Rock* (1824) may be added to the list. Moore's only failure was *Tom Cribb's Memorial to Congress* (1819), for which he had made an elaborate study of thieves' slang. It was of course on the side of the Whigs that Moore employed his pen, and his favorite topics were the system of repression in Ireland and the disabilities of the Catholics.

The disappointment of 1812, which started Moore on his career as a squib-writer, nerved him also to a more sustained effort in serious verse than he had before attempted. *Lalla Rookh* would never have been written if the author's necessities had not compelled him to work. To keep himself at the oar, he contracted with the Longmans to supply a metrical romance on an Eastern subject, which should contain at least as many lines as Scott's *Rokeby*, and for which the publishers bound themselves to pay 3,000 guineas on delivery. The poem was not published till May, 1817. Moore, as was his habit, made most laborious preparation, reading himself slowly into familiarity with Eastern

scenery and manners. The confidence of the publishers was fully justified. Moore's contemporaries were dazzled and enchanted with *Lalla Rookh*. His next Orientalism, the *Loves of the Angels*, published in 1822, was hardly less popular than *Lalla Rookh*. The artificiality of the manufacture was shown by the ease with which, after a few editions, he changed his angels from Jews into Turks, to evade a charge of impiety which was supposed to impede the sale of the work.

It was a misfortune for the comfort of the last twenty years of Moore's life that he allowed himself to be drawn into a project for writing the "History of Ireland" in *Lardner's Cyclopædia*. Scott and Mackintosh scribbled off the companion volumes on Scotland and England with very little trouble, but Moore had neither their historical training nor their dispatch in writing. The history sat like a nightmare on Moore for fifteen years, and after all was left unfinished on the melancholy collapse of his powers in 1845. From the time he burdened himself with it Moore did very little else, beyond a few occasional squibs and songs, the last flashes of his genius, and the *Travels of an Irish Gentleman in Search of a Religion*, although he had had tempting offers of more lucrative and, it might have been thought, more congenial work. Moore's last years were harassed by the weakness and misconduct of his sons, and by pecuniary embarrassments. An annual pension of £300 was conferred upon him in 1833, and he had always received large sums for his work; but, while waiting for the sinecure which never came, he had contracted an unfortunate habit of drawing upon his publishers in advance. After the death of his last child in 1845, Moore became a total wreck, but he lingered on till February 26, 1852.

MOOR-HEN, the name by which a bird, often called Water-hen and sometimes Gallinule, is most commonly known in England.

MOOSE. See DEER.

MORADABAD. See MURADABAD.

MORAL PHILOSOPHY. See ETHICS.

MORATIN, LEANDO FERNANDEZ DE, Spanish dramatist and poet, was born at Madrid in 1760 and died in 1828.

MORATIN, NICOLAS FERNANDEZ DE, Spanish poet, was born at Madrid in 1737, and died in 1780.

MORAVIA (in German MÄHREN), a margraviate and crownland in the Cisleithan part of the Austrian-Hungarian empire. Its superficial extent is about 8,580 square miles. Physically Moravia may be described as a mountainous plateau sloping from north to south, and bordered on three sides by mountain ranges of considerable elevation. Almost the whole of Moravia belongs to the basin of the March or Morava, from which it derives its name, and which, after traversing the entire length of the country in a course of 140 miles and receiving numerous tributaries (Thaya, Hanna, etc.), enters the Danube at Pressburg. The Oder rises among the mountains in the northeast of Moravia, but soon turns to the north and quits the country. With the exception of a stretch of the March none of the rivers are navigable. Moravia is destitute of lakes, but contains numerous large ponds.

Moravia belongs to the group of old Slavonic states which had preserved their nationality while losing their political independence. Upward of 70 per cent. of the inhabitants are Slavs who are scarcely distinguishable from their Bohemian neighbors. The differences in dialect between the two countries are very slight, and are being gradually lost in a common literary language. The name of Czech, however, is usually reserved for the Bohemians, while the Slavs of Moravia and West Hungary are called Moravians and Slovaks. The Ger-

mans form about 26 per cent. of the population, and are found mostly in the towns and in the border districts. The Jews are the best educated of the inhabitants, and in a few small towns form a full half of the population. Their sympathies generally lie with the Germans. In 1880 the population was 2,153,407, showing an increase of 136,133 since 1869. Moravia is one of the most densely-populated parts of Austria-Hungary, the proportion being 252 persons per square mile. About 12 per cent. of the births are illegitimate. The chief towns are Brünn, the capital and industrial center (82,660 inhabitants), Olmütz, a strong fortress defending the "Moravian Gate" (20,176 inhabitants), Znaim and Iglau.

MORAVIAN BRETHREN, THE, are a society of Christians whose history can be traced back to the year 1457 and their origin found among the religious movements in Bohemia which followed the martyrdom of John Huss by the council of Constance. The beginnings of the Bohemian Brethren (for that was their earlier name) are somewhat obscure. The followers of Huss broke up into two factions, one of which, the Calixtines, was willing to acknowledge allegiance to Rome, provided the "compacts" of the council of Basel permitting the Lord's Supper *sub utraque specie* were maintained, and in the end it became the national church of Bohemia; the other, the Taborites, refused all terms of reconciliation, and appealed to arms. Separate from both these were many pious people who were content to worship God in simple fashion, in quiet meetings for prayer and Scripture-reading, like the *Gottesfreunde* of Germany, and who called themselves *Brethren*. Bohemian historians have conclusively shown that the Brethren represent the religious kernel of the Hussite movement, and do not come either from the German Waldenses or from the Taborites.

MORAYSHIRE. See ELGIN.

MORBIHAN, a department of western France, formed of a part of Lower Brittany, lies on the Atlantic seaboard, being bounded southeast by the department of Loire-Inférieure, east by that of Ille-et-Vilaine, north by Côtes.

MORDAUNT, CHARLES. See PETERBOROUGH, EARL OF.

MORDVINIANS, more correctly MORDVA or MORDVS, are a people numbering about 1,000,000, of Finnish origin, belonging to the Ural-Altaic family, who inhabit the middle Volga provinces of Russia and spread in small detached communities to the south and east of these. Their settlement in the basin of the Volga is of high antiquity.

MORE, HANNAH, who was born at Stapleton near Bristol in 1745, may be said to have made three reputations in the course of her long life: first, as a clever verse-writer and witty converser in the circle of Johnson, Reynolds, and Garrick; next, as an animated writer on moral and religious subjects on the Puritanic side; and lastly, as a practical philanthropist. She died at Clifton on September 7, 1833.

MORE, HENRY, one of the most remarkable and interesting of the "Cambridge Platonists," was born at Grantham in Lincolnshire in the year 1614, and died September 1, 1687.

MORE, THOMAS, lord chancellor, and one of the most illustrious Englishmen of his century, was born in London, February 7, 1478. About the age of twenty More was seized with a violent access of devotional rapture. This access of the ascetic malady lasted but a short time, and More recovered, to all outward appearance, his balance of mind. But he never entirely emancipated himself from the sentiment of devotion, though in later life it exhibited itself in a more rational form. The dates

as regards More's early life are uncertain, and we can only say that it is possible that the acquaintance with Erasmus might have begun during Erasmus' first visit to England in 1499. As early as 1502 he was appointed under-sheriff of the city of London, an office then judicial, and of considerable dignity. He first attracted public attention by his conduct in the parliament of 1504 by his daring opposition to the king's demand for money. Henry VII. was entitled, according to feudal laws, to a grant on occasion of his daughter's marriage. But he came to the House of Commons for a much larger sum than he intended to give with his daughter. The members, unwilling as they were to vote the money, were afraid to offend the king, till the silence was broken by More, whose speech is said to have moved the House to reduce the subsidy of three-fifteenths which the government had demanded to £30,000. One of the chamberlains went and told his master that he had been thwarted by a beardless boy. Henry never forgave the audacity; but, for the moment, the only revenge he could take was upon More's father, whom, upon some pretext, he threw into the Tower, and only released him upon payment of a fine of £100. Thomas More found it advisable to withdraw from public life into obscurity. During this period of retirement the old dilemma recurred. One while he devoted himself to the sciences, "perfecting himself in music, arithmetic, geometry and astronomy, learning the French tongue, and recreating his tired spirits on the viol," or translating epigrams from the Greek anthology; another while resolving to take priest's orders.

From dreams of clerical celibacy he was roused by making acquaintance with the family of John Colt of New Hall, in Essex. The "honest and sweet conversation" of the daughters attracted him, and though his inclination led him to prefer the second he married the eldest, not liking to put the affront upon her of passing her over in favor of her younger sister. The death of the old king in 1507 restored him to the practice of his profession, and to that public career for which his abilities specially fitted him. From this time there was scarce a cause of importance in which he was not engaged. It was not long before he attracted the attention of the young king and of Wolsey. The spirit with which he pleaded before the Star Chamber in a case of the Crown *v.* the Pope, recommended him to the royal favor, and marked him out for employment. More obtained in this case judgment against the crown. Henry, who was present in person at the trial, had the good sense not to resent the defeat, but took the counsel to whose advocacy it was due into his service. In 1514 More was made master of the requests, knighted, and sworn a member of the privy council.

In 1529 he was made lord chancellor. Unfortunately for Sir Thomas More, a lord chancellor is not merely a judge, but has high political functions to perform. In raising More to that eminent position, the king had not merely considered his professional distinction, but had counted upon his avowed liberal and reforming tendencies. But in the king's mind the public questions of reform were entirely sunk in the personal one of the divorce. The divorce was a point upon which Sir Thomas would not yield. And, as he saw that the marriage with Anne Boleyn was determined upon, he petitioned the king to be allowed to resign the great seal, alleging failing health. With much reluctance, the royal permission was given and the resignation accepted, May 10, 1532.

But More was too conspicuous to be long allowed to enjoy the happiness of a retired life. A special invitation was sent him by the king to attend the coronation of Anne Boleyn, accompanied with the gracious offer of

£20 to buy a new suit for the occasion! More refused to attend, and from that moment was marked out for vengeance. A first attempt made to bring him within the meshes of the law only recoiled with shame upon the head of the accusers. They were maladroit enough to attack him on his least vulnerable side, summoning him before the privy council to answer to a charge of receiving bribes in the administration of justice. The charges were refuted triumphantly. But the very futility of the accusations must have betrayed to More the bitter determination of his enemies to compass his destruction.

In 1534 the Act of Supremacy was passed, and the oath ordered to be tendered. More was sent for to Lambeth, where he offered to swear to the succession, but steadily refused the oath of supremacy as against his conscience. Thereupon he was given in charge to the abbot of Westminster, and, persisting in his refusal, was four days afterward committed to the Tower. After a close and even cruel confinement (he was denied the use of pen and ink) of more than a year, he was brought to trial before a commission on a charge of high treason. Even so More would have been acquitted, when at the last moment Rich, the solicitor-general, quitted the bar and presented himself as a witness for the crown. Being sworn, he detailed a confidential conversation he had had with the prisoner in the Tower. He affirmed that, having himself admitted in the course of this conversation "that there were things which no parliament could do—*e.g.*, that no parliament could make a law that God should not be God," Sir Thomas had replied, "No more could the parliament make the king supreme head of the church." By this act of perjury a verdict of "guilty" was procured from the jury. The execution of the sentence followed within the week, on July 7, 1535.

MOREAU, HÉGÉSIPPE, a minor lyric poet of disputed but considerable talent, was born at Paris on April 9, 1810, and died in the hospital of La Charité on December 10, 1838.

MOREAU, JEAN VICTOR, the greatest general of the French republic after Napoleon and Hoche, was born at Morlaix in Brittany in 1763. In 1792, at the call for volunteers he organized a battalion, and was at once elected its commandant. With it he served under Dumouriez, and in 1793 the good order of his battalion, and his own martial character and republican principles secured his promotion as general of brigade. Carnot, who had an eye for the true qualities of a general, promoted him to be general of division in 1794, and gave him command of the right wing of the army which, under Pichegru, was destined to drive the English and Austrians out of Flanders by separating the Austrians from the English. This wing was then to cover the occupation of Holland by the main army under Pichegru. These operations established his military fame, and in 1795 he was given the command of the army of the Rhine and the Moselle, with which he crossed the Rhine and advanced into Germany. He was at first completely successful, and won several victories, but at last had to execute before the archduke Charles a retreat which only increased his fame, as he managed to bring back with him more than 5,000 prisoners. In 1797 he again crossed the Rhine, but his operations were checked by the conclusion of the preliminaries of Leoben between Bonaparte and the Austrians. It was at this time he found out the traitorous correspondence between his old comrade and commander Pichegru and the prince de Condé, which he foolishly concealed, and naturally he has ever since been suspected of at least partial complicity. After Fructidor the Directory ceased to employ his service, until the absence of Bonaparte and the advance of Suwaroff made it necessary to have some great

general in Italy. Yet it was only as chief of the staff that he served under Scherer and Joubert, and led back the French army after the latter's death at Novi. When Bonaparte returned from Egypt he found Moreau at Paris, greatly dissatisfied with the Directory both as a general and as a republican, and obtained his assistance in the *coup d'état* of Brumaire, when Moreau commanded the force which occupied the Luxembourg. In reward, the first consul again gave him command of the army of the Rhine, with which he fought his last great campaign, that of Hohenlinden, when his success was due rather to the splendid military qualities of his generals and their troops, and his own tactical genius, than to any inspiration of victory. On his return to Paris he married Mdlle. Hullot, an ambitious woman, who gained a complete ascendancy over him, and with the enormous fortune acquired during his campaigns he purchased a luxurious hotel in Paris and also Barras' country-seat of Grosbois. His wife exercised an evil influence over him, and collected around her all who were discontented with the aggrandizement of Napoleon. This "club Moreau" frightened Napoleon, and encouraged the royalists; but Moreau, though not unwilling to become a military dictator to restore the republic, would not intrigue for the restoration of Louis XVIII. All this was well known to Napoleon, who seized the conspirators. Moreau he treated with real leniency, and permitted to retire first to Spain, and then to America. Here the general lived in great content for seven years, when his wife, who could not allow him to rest, made him enter into negotiations with Bernadotte, his old comrade, who was now crown-prince of Sweden. At his suggestion Moreau entered the service of the czar Alexander; and with Bernadotte he planned the campaign of 1813. Fortunately for his fame as a patriot he did not live to invade France, but was mortally wounded while talking to the czar at the battle of Dresden on August 27, 1813, and died on September 2d.

MOREL or MORCHELLA. See MUSHROOM.

MORELIA, formerly VALLADOLID, a city of Mexico, capital of the State of Michoacan de Ocampo, is situated 125 miles west-by-north of Mexico. In 1750 the city had about 18,000 inhabitants, in 1873 the municipality had 36,940 and the city proper about 30,000, and in 1880 the number is stated at 20,400.

MORELLET, ANDRÉ, economist and miscellaneous writer, was born at Lyons in 1727, and died in 1819.

MORETO, AGUSTIN, Spanish dramatist and playwright, was born at Madrid in 1618, and died in 1669.

MORETTO, IL ("The Blackamoor," a term which has not been particularly accounted for), is the name currently bestowed upon ALESSANDRO BONVICINO, a celebrated painter of Brescia, Venetian school. He was born at Rovato in the Brescian territory in 1498. His death took place toward 1560.

MORGAGNI, GIOVANNI BATTISTA, the founder of pathological anatomy, was born February 25, 1682, at Forlì, an ancient and important town on the Æmilian road southward from Bologna. He died in 1771.

MORGAN, SYDNEY OWENSON, LADY, novelist and miscellaneous describer and critic, was one of the most vivid and hotly-discussed literary personages of her generation. She was born in 1777 and died in 1859.

MORGANATIC MARRIAGE. See MARRIAGE.

MORGHEN, RAFFAELLO SANZIO, a distinguished engraver, was born at Naples on June 19, 1758. He died at Florence on April 8, 1833.

MORHOF, DANIEL GEORG, the learned author of a survey of universal literature entitled *Polyhistor*, was born at Wismar in 1639, studied law at Rostock, and was appointed professor of poetry there in 1660. He died at Lübeck in 1691.

MORIAH. In 2 Chron. iii. 1 we read that Solomon built the Temple at Jerusalem on Mount Moriah (הַר הַמֹּרְיָה). This name for the Temple hill, the ancient Zion, is not found elsewhere in the Old Testament, and can hardly have been a current one. But a mountain in the "land of Moriah" was the place where Abraham was commanded to sacrifice Isaac; Josephus (*Ant.*, i. 13, 2) assumes that this *Μωρίων ὄρος* was the Temple hill, and the same view is expressed in the Targums.

MORIER, JAMES, English traveler and author, was born in 1780 and died at Brighton, March 23, 1849.

MORILLON, a name commonly given by fowlers to the female or immature male of the GOLDEN EYE, the *Clangula glaucion* of modern ornithology.

MORIN, JEAN, or, in Latin, JOANNES MORINUS, the most learned Catholic theologian of his time and one of the founders of Biblical criticism, was born in 1591 at Blois. His pen sometimes brought him into trouble. The *Histoire de la délivrance de l'Église Chrétienne par l'emp. Constantin, et de la grandeur et souveraineté temporelle donnée à l'Église Romaine par les rois de France* (1630) gave great offense at Rome, and a *Déclaration* (1654), directed against faults in the administration of the Oratory and reflecting on the general (Father Bourgoing), was strictly suppressed. So, too, his great work on penance gave equal offence to the Jesuits and to Port Royal, and even after his death (1659) Protestants long treated his valuable contributions to the history of the Hebrew text as a mere utterance of Popish prejudice.

MORLAIX, the chief town of an arrondissement in the department of Finistère, France, lies 350 miles west of Paris on the railway from Paris to Brest, and at the confluence of two small streams, seven miles distant from the sea.

MORLAND, GEORGE, animal and subject painter, was born in London June 26, 1763. The finest of Morland's subjects date from 1790 to 1792. He was arrested for debt, and died in a sponging house in Eyre street, Coldbath Fields, October 29, 1804. His wife survived him only some three days, and they were buried in one grave.

MORMONS, or, as they call themselves, THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS, are a religious sect founded by Joseph Smith. Smith was the son of a farmer, and was born in the town of Sharon, Windsor county, Vt., December 23, 1805. He professed to have received a revelation from an angel directing him to search for the "Book of Mormon," which was deposited "on the west side of a hill, not far from the top, about four miles from Palmyra, in the county of Ontario, and near the mail-road, which leads thence to the little town of Manchester," N. Y. He advised him to go and view it, which Smith did; but the prophet was not yet holy enough to obtain possession of it. At length, after due disciplinary probation, the angel of the Lord, on September 22, 1827, placed in Smith's hands the wonderful records. They were engraven on plates nearly eight inches long by seven wide, a little thinner than ordinary tin, and bound together by three rings running through the whole. The volume was altogether about six inches in thickness, a part of which was sealed. The characters, letters, or hieroglyphics upon the unsealed part were small, and beautifully engraved. They represented an unknown language, called the "Reformed Egyptian." Along with the records was found a curious instrument, called by Smith "Urim and Thummim," consisting of two transparent stones set in the rim of a bow fastened to a breastplate. By means of these stone spectacles, God enabled him to understand and translate the an-

cient records into such humble English as the "prophet" (who had received almost no school education, and could read with difficulty) was master of. The records contain the primitive history of America, from its first settlement by a colony that came from the Tower of Babel at the confusion of languages, the facts on which the religious faith of the Mormons is founded, and were the work of a prophet called Mormon, who had been commissioned by God to write an abridgment of all their prophecies, histories, etc., and to hide it in the earth till God should see fit to bring it forth, and "unite it with the Bible for the accomplishment of his purposes in the last days." This is the famous Book of Mormon. In 420 A.D., they were finally sealed up where Smith found them, by Moroni, one of the few survivors of the Battle of Cumorah. The Book of Mormon finally appeared before the world in 1830, with the names of Oliver Cowdery, Martin Harris and David Whitmer appended to a statement, that an angel of God had come down from heaven and shown them the original plates. The work of proselytizing was begun, and on April 6, 1830, the *Church of Jesus Christ of Latter-day Saints* was first organized in the town of Manchester, State of New York. In January, 1831, Smith and his followers considered it prudent to remove to a distant part of the country. They established themselves at Kirtland, in Ohio, which was to be the seat of the New Jerusalem. About this time the licentiousness of Smith might have led to the dissolution of the church but for the accession of Brigham Young, a Vermont painter and glazier, thirty years old, who turned up in Kirtland in 1832, and was immediately ordained elder. Young's indomitable will, persuasive eloquence, executive ability, shrewdness, and zeal soon made their influence felt, and when a further step was taken in 1835 toward the organization of a hierarchy by the institution of the quorum of the "twelve apostles," who were sent out as proselytizing missionaries among the "gentiles," Young was ordained one of the "twelve," and dispatched to preach throughout the Eastern States.

They now made immense progress. In 1836 a large temple was consecrated in Kirtland, and in the following year Orson Hyde and Heber C. Kimball were sent off as missionaries to England, where, among the laboring masses in Manchester, Liverpool, Birmingham, Leeds, Glasgow, and the mining districts of South Wales, they achieved a remarkable success. Early in 1838 the Kirtland bank failed, and Smith and Rigdon fled to Caldwell county, Missouri, where a large body of the saints, after having been driven successively from Jackson and Clay counties, had taken refuge. Here for a time they prospered, but at last they were compelled to quit the State, and the whole body of Saints, 15,000 in number, emigrated from Missouri to Illinois, and settled at Nauvoo. Smith's troubles, however, continued to increase. His gross profligacy had repelled many of his leading supporters, and bred internal dissensions, while from the outside the brethren were harassed and threatened by the steadily growing hostility of the native Missourians. To counteract the efforts of his enemies, a secret society was organized in Smith's favor in October, 1838, called the Danites, with the avowed purpose of supporting Smith at all hazards, of upholding the authority of his revelation and decrees as superior to the laws of the land, and of helping him to get possession, first of the State, then of the United States, and ultimately of the world. To such a height did the inner dissensions and the conflicts with the "gentiles" grow that they assumed the proportions of a civil war, and necessitated the calling out of the State militia. Defying the legal officers, Smith fortified the

town and armed the saints, but finally had to succumb to superior numbers. Smith and Rigdon were arrested and imprisoned on a charge of treason, murder, and felony, and their followers to the number of 15,000 crossed over into Illinois and settled near Commerce, Hancock county. Here they were shortly afterward rejoined by Smith, who succeeded in escaping from prison, and, having obtained a charter, they founded the city of Nauvoo. Such were the powers granted them by this charter as to render the city practically independent of the State government, and to give Smith all but unlimited power. He organized a military body called the Nauvoo legion, of which he constituted himself commander with the title of lieutenant-general, while he was also president of the church and mayor of the city. On April 6, 1841, the foundations of the new temple were laid, and the city continued to grow rapidly in prosperity and size. But Smith's vices were beginning to bear fruit.

Prior to the settlement in Missouri polygamy had not been practiced, but was denounced. However, about this time it was grafted on to the system as the result of a special revelation, the process being termed "sealing of spiritual wives." The country about Nauvoo was a mere wilderness when the Mormons settled in it; it soon began to rejoice and blossom as the rose. But the doctrine of "sealing wives" once more roused the wrath of the neighborhood, and serious disturbance took place, the ultimate result of which was that the prophet and his brother Hyrum were thrown into prison at Carthage. After a short time it began to be rumored that the Governor of the State was desirous of letting the two Smiths escape, whereupon a band of "roughs," about 200 in number, broke into the jail, June 27, 1844, and shot them. It may here be stated that it cannot be shown that Smith was a polygamist, in our sense of the word. Years after his death, Brigham Young produced a paper which he said was a copy of a "revelation" made to Joseph at Nauvoo, commanding him to take as many wives as God should give him. But it was not till August 29, 1852, at a public meeting held in Salt Lake City that the "revelation" was formally received. Smith's death created great agitation and confusion among his followers. Sidney Rigdon and others aspired to succeed him, but the Council of the Twelve Apostles unanimously elected Brigham Young. The Legislature of Illinois having revoked, in 1845, the charter given to the city of Nauvoo, and the hostility of their neighbors not having in the least abated, the Saints resolved to emigrate far beyond the boundaries of civilization, and to seek a new home amid the solitudes of the Rocky Mountains, where they might pass their lives in unmolested peace. Explorers were sent out to examine the country, and brought back a favorable report of the Great Salt Lake Valley. Brigham Young arrived in the valley, July 24, 1847, and the main body of the Mormons in the autumn of 1848. In 1850 the government of the United States admitted the region occupied by the Mormons into the Union as a Territory, under the name of Utah, and Brigham Young was appointed governor by President Fillmore. Brigham Young was soon suspended from his office of governor, and Colonel Steptoe of the United States army was appointed his successor. During the following years, the collisions between the United States officers and the Saints became more and more frequent, and in the spring of 1856, the whole of the former were forced to flee from the Territory. After the close of the Civil War, the United States Government determined to insist on its authority. A Federal Governor was again appointed, and polygamy was declared, in 1871, to be a criminal practice contrary to the laws of the United

States; Brigham Young was even arrested. In 1877 he died, leaving a fortune of \$2,000,000 to seventeen wives and fifty-six children. He was succeeded in office by John Taylor, an Englishman, although the actual leadership fell to George Q. Cannon, "first counselor" to the president, and one of the ablest men in the sect. One of the most notable events in the recent history of the Mormons took place in the year of Brigham Young's death. John D. Lee, a Mormon bishop, was brought to trial and executed for his share in a crime till then uninvestigated. In 1857 a party of Mormons and Indians, under Lee's command, assaulted a train of 150 non-Mormon emigrants at Mountain Meadows, near Utah, and massacred every soul of them. Of late years the question of Mormonism has largely occupied public attention. In 1873 Mr. Frelinghuysen introduced a bill severely censuring polygamy, and declaring that the wives of polygamists could claim relief by action for divorce. In 1874 the committee of the House of Representatives reported a bill which reduced Utah to the position of a province, placing the control of affairs in the hands of Federal officials, and practically abolishing polygamy. In the same year George Q. Cannon was elected a delegate from Utah, and, though his election was contested, it was confirmed by the House of Representatives. This decision, however, was accompanied by the passing of a resolution by a vote of 127 to 51 appointing a committee of investigation into Delegate Cannon's alleged polygamy, he having, it was asserted, four wives. Later in the same year the Utah Judiciary Bill, attacking the very foundation of Mormonism, passed the House in spite of the eloquent opposition of Cannon. Other steps in the same direction were taken, and bills passed, having for their object the extirpation of polygamy, but all without immediate and practical effect. In 1882 the United States House of Representatives opened its long threatened campaign against the Mormons, and by a majority of nearly four to one, passed a bill prohibiting polygamy within the Union. Since then numerous prosecutions have been made under the law, and the practice may be said to be suppressed.

The secession, chiefly because of his opposition to the practice, of Brigham Young's son, a Christian preacher, and of a large body of other anti-polygamists who claim to be the true Latter-Day Saints, represents not an individual opinion, but the deep-rooted conviction of a great party, and the day is not far distant when the Mormons who acknowledge John Taylor as chief prophet must consent to lop off polygamy or cease to exist as a corporate body of the United States. Already there are not wanting signs of approaching dissolution, of which perhaps the most significant is the conference of the "Reorganized Church of Jesus Christ of Latter-Day Saints," held on April 6, 1883, at Kirtland, Lake county, Ohio. This sect originated in 1851, seven years after the death of Joseph Smith, when several officers of the church met and claimed to have received a revelation from God, directing them to repudiate Brigham Young, as not being the divinely-appointed and legitimate successor of Joseph Smith, and as being the promulgator of such false doctrines as polygamy, Adam-God worship, and the right to shed the blood of apostates. Nothing of special importance occurred, however, until 1860, when Joseph Smith, Jr., the eldest son of the founder of the faith, became identified with the Reorganized Church as its president. Since then the seceders have prosecuted missionary work throughout the United States, Great Britain, Canada, Scandinavia, Switzerland, Australia, and the Society Islands, until their communicants are said to number over 27,000. Their headquarters are at Plano, Ill., to which place

they removed from Lamoni, Iowa, in 1881. The Reorganized Church holds that the legitimate successor to Joseph Smith was his eldest son, that the allegation that Smith introduced polygamy on the strength of divine revelation was an invention of Brigham Young, that the Utah Church has departed grievously from the faith and practices laid down in the *Book of Mormon* and subsequent revelations to Joseph Smith, and that the Reorganized Church is the only true and lawful continuation of, and successor to, the original church, and as such is legally entitled to all the church's property and rights. And it was to celebrate the decision of the United States Court of Ohio confirming this last claim, and vesting in them the right to the temple consecrated in Kirtland, Ohio, in 1836, and for nearly forty years disused owing to litigation, that the Reorganized Church met in that temple on April 6, 1883.

Returning to the main body, it may be added that the population of Utah is 147,000, of whom 123,000 are Mormons; but, as the saints are scattered over the globe, it is difficult to arrive at a just estimate of their complete numerical strength. In Idaho, Arizona, Washington, Colorado, Montana, and Wyoming they have of late years made great progress, and their number in the United States outside of Utah cannot fall much under 27,000. In Europe they have also many adherents, and a careful study, based on recent official statistics, would place their entire number at 213,000.

MORNAY, PHILIPPE DE, Seigneur du Plessis-Marly, very generally known as Mornay Du Plessis or Du Plessis-Mornay, one of the most distinguished members of the Protestant party in France, was born at Buhy in Normandy on November 5, 1549, and died in 1623.

MORNY, CHARLES AUGUSTE LOUIS JOSEPH, DUC DE, was the natural son of Hortense Beauharnais, queen of Holland, and of the comte de Flahaut, a leading dandy of the period, and was thus brother to Napoleon III. The secret of his birth (October 23, 1811) was carefully kept; he was acknowledged as son by the comte de Morny for a consideration, and was brought up by his paternal grandmother, Madame de Souza, a writer of society novels, and a woman of great wit and high breeding.

Morny was, on the day of the *coup d'état*, made minister of the interior, but he had no taste for the drudgery of administration, and, in January, 1852, found an excuse for resigning on the question of the property of the Orleanist princes. The empire established, he was able to begin speculating, and used both the money of the state and his influence with his brother for the success of his schemes. He had been in 1852 reelected deputy for Clermont-Ferrand, and was in 1854 elected president of the corps législatif, an office which he held the rest of his life.

In 1856 he was special ambassador at the coronation of Czar Alexander II., when he spent immense sums, and married a wealthy Russian, Princess Troubetzkoy. In 1862 he was created a duke, and in 1865, after continuing to the last his career of dissipation, died of sheer anæmia from the measures he took to keep himself fit for yet further excesses.

MORO, ANTONI, otherwise known as SIR ANTHONY MORE, an eminent portrait-painter, was born at Utrecht, in 1512 according to some, but in 1525 according to Van Mander. His death took place at Antwerp about 1581.

MOROCCO, or MAROCCO, the term (corrupted from the name of the city Marrákush) used in English to designate the Maghrib al-Aksá or extreme west of the Arabs, is the country at the northwestern corner of the African continent, with the Mediterranean on the north and the Atlantic on the west. Its landward limits can

only be vaguely defined. The eastern frontier toward Algeria, determined by the treaty of 1844, is a purely conventional line starting from the mouth of a small stream called the Skis and running across country in a general south-southeast direction. The southern boundaries expand and contract according to the power and activity of the central authorities. Behm and Wagner (1882), who include Táfilelt, Kenatsa, Figig, Twat, Gurara, Tidikelt, the plateau of Tedmaid, etc., estimate the total area of the sultanate at 305,548 square miles; and this, which is about twice the size of Algeria, or five times that of England and Wales, may be taken as a maximum. The allegiance of many of the tribes within this compass is questionable and intermittent. Morocco is still the portion of Northern Africa about which European information is most defective, and the ordinary maps are composed to a large extent of most unscientific material eked out by probabilities and conjecture. Since the middle of the present century a good deal has been done in the way of exploration, mainly in the low lands and steppes sloping toward the Atlantic, the country of the great historical cities of Tangiers, Fez, Meknes (Mequinez), and Morocco; but even there what lies but a few miles east or west of some track traversed by Europeans for centuries remains matter of question.

Since the publication of Arlett's survey from Cape Spartel to Cape Bojador (1840-44) and of Vincendon-Dumoulin and Kerhallet's surveys from the Strait of Gibraltar to the Algerian frontier (1853-57) the seaward aspect of Morocco has been known in detail. To the Mediterranean it presents for a distance of about 200 miles the rugged profile of the Rif hills (still unexplored), which generally end in lines of cliff broken at intervals by narrow sweeps of sandy beach, but occasionally open up into beautiful and fertile valleys, with abundant evidence of human occupancy and tillage. About six miles west of the Skis lies the mouth of the great river Mulúya; and ten miles farther on, opposite Cape del Agua (Kas Sidi Beshir), is a group of dry and barren islands known as the Zafarines, which form the best roadstead on the Rif coast. Between Point Quiviana and Melilla runs a low and sandy shore in front of a great salt marsh, the Puerto Nuevo of the Spaniards. Melilla (Malíla) is a fortified town, held by the Spaniards since 1653, built on a rocky peninsula and connected by lines of rampart with Fort Rosario on the heights behind. Near the village of Azanen is a wide open shore with the only sand-dunes on all this coast. The fine semicircular bay of Allucemas is the seaward end of one of the most beautiful valleys in the Rif, clothed with verdure and dotted with hamlets. A Spanish *presidio* occupies one of the larger of the Allucemas islands (Al-Mazemma), which are identified with the Ad Sex Insulas of the itineraries. Another Spanish fortress crowns the rocky island of San Antonio or Peñon de Velez; and in the valley off which it lies stood a town known to the Spaniards as Velez de Gomera, to the Arabs as Bádis, which continued to be a place of importance in the sixteenth century. The so-called Bay of Tetuan—the town is just visible from the sea—is little more than the straight stretch of coast between Cape Mazari on the south and Cape Negro or Negrete on the north; but the prominence of these two headlands gives it an appearance of depth. From Cape Negro northward to Ceuta the most notable object on the horizon is the summit of Jebel Músá, which, though situated on the Strait of Gibraltar, towers above the intervening hills. Ceuta (Sebta), the most important and flourishing of the Spanish settlements in Morocco, occupies a peninsula—the head, Mt. Acho, standing about four miles out to sea, and the neck being low and

narrow. It marks the eastern end of the strait. Westward, the first point of interest is again Jebel Músá, the Elephas of Strabo, and the Ape's Hill of English charts; the truncated top is usually hid in clouds. About twenty miles farther along the coast lies the Bay of Tangiers, by far the finest harbor in Morocco. West from Tangiers runs the Jebel Kebír (880 feet at its highest), the seaward extremity of which forms the celebrated Cape Spartel, the northwest angle of the African continent, known to the ancients as Ampelusius or Cotes Promontorium. The lighthouse, built in 1864, at the cost of the sultan of Morocco, and maintained at the joint expense of England, France, Italy, and Spain, is the only one on the western coast.

The present state of Morocco is deplorable. The government is an Oriental despotism under an independent quasi-hereditary sultan; there are no administrative functionaries with definite responsibility and regular salary; the distribution of justice is utterly arbitrary, and the punishments often barbarous in the extreme; education, in the European sense of the word, there is none; foreign commerce is hampered by vexatious prohibitions and restrictions, internal trade by the almost complete absence of roads and bridges, and by the generally lawless state of the country (the very peasant has his gun beside him as he plows); the only substitute for a postal system is a class of running couriers; and even the army (in which the sultan does take an interest) is only just beginning to show signs of discipline and effectiveness under the supervision of Káid M'Clean and other foreign officers. The last remnants of the once powerful Moorish fleet are rotting beyond recognition in the harbor of Larash. With good government and freedom of trade the country might soon be restored to a high state of prosperity; its climate, soil, products, and the qualities of its predominant population are full of promise; and the evident decrease of hostility toward the Christian, which may be observed since the beginning of the century, and especially within recent years, gives hope that European influence, apart from European conquest, may before long remove from Morocco the reproach of being "the China of the West," the most backward and barbarous of civilized nations.

MOROCCO, or MAROCCO (Marrákush), one of the quasi-capitals of the sultanate (Fez and Meknes being the other two), lies in a spacious plain about fifteen miles from the northern underfalls of the Atlas, and ninety miles east-southeast of Saffi. Ranking during the early centuries of its existence as one of the greatest and most flourishing cities of Islam, Morocco has long been in a state of grievous decay; and were it not for the exceptional beauty of its situation, the luxuriant groves and gardens by which it is encompassed and interspersed, and the magnificent outlook which it enjoys toward the mountains, it would be altogether a very miserable place.

MORON, or MORON DE LA FRONTERA, a town of Spain, in the province of Seville, about thirty-two miles to the southeast of that city, occupies an irregular site upon broken chalk hillocks at a distance of a mile and a half from the right bank of the Guadaira. It is connected by rail with Utrera on the Cadiz and Seville line. The population of the town is 15,000.

MORONI, GIAMBATTISTA, an eminent portrait-painter of the Venetian school, was born at Albino near Bergamo about 1510. Moroni was engaged upon a *Last Judgment* in the church of Corlago when he died on February 5, 1578.

MOROSINI, the name of a noble Venetian family. The most distinguished member of the house of Morosini was Francesco, the captain-general of the republic against the Turks and conqueror of the Morea. He

was born in 1616. In 1666 he was in command during an unfortunate campaign in Candia. In 1687 he conquered Patras, and so opened the Morea to the Venetian arms. In the following year he was elected doge. After his return to Venice the republic suffered severely in Candia, and though now an old man Francesco took the field again in 1693, but died the next year at Nauplia, seventy-six years of age.

MORPETH, a municipal and parliamentary borough of Northumberland, England, is situated in a fine valley on the Wansbeck, and on the Northeastern Railway, fifty miles south of Berwick and sixteen north of Newcastle.

MORPHEUS is a personification, apparently invented by Ovid, of the power that calls up shapes before the fancy of a dreamer. Morpheus is naturally represented as the son of Sleep (Somnus).

MORPHIA. See OPIUM.

MORPHOLOGY. The term Morphology, introduced by Goethe to denote the study of the unity of type in organic form (for which the Linnæan term METAMORPHOSIS (*q.v.*) had formerly been employed), now usually covers the entire science of organic form.

If we disregard such vague likenesses as those expressed in the popular classifications of plants by size into herbs, shrubs, and trees, or of terrestrial animals by habit into beasts and creeping things, the history of morphology commences with Aristotle. Founder of comparative anatomy and taxonomy, he established eight great divisions (to which are appended certain minor groups)—*Viviparous Quadrupeds, Birds, Oviparous Quadrupeds and Apoda, Fishes, Malakia, Malacostraka, Entoma, and Ostracodermata*—distinguishing the first four groups as *Enaima* ("with blood") from the remaining four as *Anaima* ("bloodless"). In these two divisions we recognize the Vertebrata and Invertebrata of Lamarck, while the eight groups are identical with the Mammals, Birds, Reptiles, Fishes, the Cephalopods, Crustaceans, other Articulates, and Testaceans of recent zoölogy. Far, too, from committing the mistake often attributed to him of reckoning Bats as Birds, or Cetaceans as Fishes, he discerned the true affinities of both, and erected the latter into a special genus beside the Viviparous Quadrupeds, far more on account of their absence of limbs than of their aquatic habits. Not only is his method inductive, and, as in modern systems, his groups natural, *i.e.*, founded on the aggregate of known characters, but he foreshadows such generalizations as those of the correlation of organs, and of the progress of development from a general to a special form, long afterward established by Cuvier and Von Baer respectively. In the correspondence he suggests between the scales of Fishes and the feathers of Birds, or at that hinted at between the fins of Fishes and the limbs of Quadrupeds, the idea of homology too is nascent; and from the compilation of his disciple Nicolaus of Damascus, who regards leaves as imperfectly-developed fruits, he seems almost to have anticipated the idea of the metamorphosis of plants. In short, we find a knowledge of structural facts and a comparative freedom from the errors induced by physiological resemblance, of which his successors such as Theophrastus and Pliny, generally mere classifiers by habit, show little trace, and which the moderns have but slowly regained. Little indeed can be recorded until the thirteenth century, when the reappearance of Aristotle's works gave a new impulse to the study of organic nature. Of the works of this period that of Albertus Magnus is far the most important; but they are all no more than revivals of Aristotle, marking the reappearance of scientific method and the reawakening of interest in and sympathy with

nature. Meanwhile leech and apothecary, alchemist and witch, were accumulating considerable knowledge of plants, which, after the invention of printing, became collected and extended in the descriptive and well-illustrated folios of Gessner and his successors Fuchs, Lobel, and others, as well as by the establishment of botanic gardens and scientific academies, while as Sachs expresses it, "in the sharpest contrast to the naive empiricism of the German fathers of botany came their Italian contemporary Cæsalpinus, as the thinker of the vegetable world." Both made systematic efforts—the Germans vaguely seeking for natural affinities in mere similarities of habit, the Italian with no inconsiderable success striving toward an intellectual basis of classification. Monographs on groups of plants and animals frequently appeared, those of Belon on Birds and Rondelet on Fishes being among the earliest; and in the former of these (1555) we find a comparison of the skeletons of bird and man in the same posture and as nearly as possible bone for bone—an idea which, despite the contemporaneous renaissance of human anatomy initiated by Vesalius, disappeared for centuries unappreciated save by the surgeon Ambroise Paré. Palissy, like Leonardo before him, discerned the true nature of fossils; and such flashes of morphological insight continued to appear from time to time during the seventeenth century.

The encyclopædic period of which Gesner is the highest representative was continued by Aldrovandi, Jonston, and others in the seventeenth century, but, aided powerfully by the Baconian movement, then profoundly influencing all scientific minds, it developed rapidly into one of genuinely systematic aim. At this stage of progress by far the most important part was taken by John Ray, whose classificatory labors both among plants and animals were crowned with marvelous success. He first definitely expelled the fabulous monsters and prodigies of which the encyclopædists had faithfully handed on the tradition from mediæval times, and, like his predecessor, Morison, classifying in a truly modern spirit by anatomical characters, he succeeded, particularly among plants, in distinguishing many natural groups, for which his very terms sometimes survive, *e.g.*, Dicotyledons and Monocotyledons, Umbelliferae and Leguminosae. The true precursor of Linnæus, he introduced the idea of *species* in natural history, afterward to become so rigid, and reformed the practice of definition and terminology. Of the many works which followed up Ray's systematic and monographic labors, though often, like those of Tournefort and Rivinus, Réaumur and Klein, of great importance, none can be even named until we come to those of his great successor, Linnæus, whose extraordinary grasp of logical method and unparalleled lucidity of thought and expression enabled him to reform and reorganize the whole labors of his predecessors into a compact and definite "*systema naturæ*." The very genius of order, he established modern taxonomy (see BIOLOGY), not only by the introduction of the binomial nomenclature and the renovation of descriptive terminology and method, but by the subordination of the species, henceforth clearly defined, and the successive higher categories of genus, order, and class, so finally reconciling the analytic and synthetic tendencies of his predecessors.

While the artificial system was at the zenith of its fame and usefulness, Bernard de Jussieu was arranging his garden on the lines afforded by the fragmentary natural system of Linnæus. His ideas were elaborated by his nephew and successor Antoine de Jussieu, who for the first time published diagnoses of the natural orders, so giving the system its modern character.

The labors of Bernard and Antoine de Jussieu initi-

ated to a vast parallel advance in zoölogy, the joint memoir on the classification of mammals with which Cuvier and Geoffroy St.-Hilaire almost commenced their career receiving its dominant impulse from the "genera" of Antoine. Cuvier's works correspond in zoölogy to those of the whole period from the Jussieu's to Brown, and epitomize the results of that line of advance. Although in some respects preceded by Haller and Hunter, who compared, though mainly with physiological aim, the same parts in different organisms, and much more distinctly by Vicq d'Azyr, the only real comparative anatomist of the eighteenth century, he truly opens the era of detailed anatomical research united with exact comparison and clear generalization. The *Règne Animal* (1817) and the theory of types (vertebrate, molluscan, articulate, and radiate) are the results of this union of analysis and synthesis (although he himself, exasperated by the aberrations of the Naturphilosophie, was accustomed to proclaim the importance of detailed empiricism alone), and mark the reconstitution of taxonomy on a new basis, henceforth to be no longer a matter of superficial description and nomenclature but a complete expression of structural resemblances and differences. More even than Linnæus he is the founder of a great school, whose names and labors are imperishable. In Germany, Bojanus, Meckel, Von Siebold, and the illustrious Johannes Müller, with his many living pupils, have carried on the work; in France, too, a succession of brilliant anatomists, such as De Quatrefages, Milne-Edwards, and Lacaze-Duthiers, are his intellectual heirs; and in England he has been admirably represented by Owen.

The term *morphology* was first introduced by Goethe in 1817, in a subsequent essay. It did not come into use in botany until its popularization by Auguste de St.-Hilaire in his admirable *Morphologie Végétale* (1841), and in zoölogy until later, although De Blainville, who also first employed the term *type*, had treated the external forms of animals under "morphologie." Though the Naturphilosophie of Schelling and its countless modifications by his followers, its mystic theories of "polarization" and the like, its apparatus of assumption and abstraction, hypothesis and metaphor, cannot here be discussed, its undoubted services must not be forgotten, since it not only stimulated innumerable reflective minds to the earnest study of natural science, but, by its incessant proclamation of the unity of nature and the free use of Platonic archetypes gave a most powerful impulse to the study of comparative anatomy, and nobly vindicated the claims of philosophic synthesis over those of merely analytic empiricism. Among its many adherents, some are of more distinctly theological type, others metaphysical, others mystical or poetic, others, again, more especially scientific; but its most typical and picturesque figure is Lorenz Oken, who epitomizes alike the best and the worst features of the school, and among whose innumerable pseudo-morphological dreams there occasionally occurred suggestions of the greatest fruitfulness—notably, for instance, the independent statement of the vertebral theory of the skull.

Strict classification of forms supposed constant excludes any *natural* relationship. The type theory, the theory of unity of organic composition, and the like, are susceptible indeed of two explanations; they may be either regarded as expressing a creative plan, or taken as purely Platonic and archetypal ideas. Both are tenable on theological and metaphysical grounds respectively, but the fact must not be disguised that of this unity of type no explanation in the least degree scientific, *i.e.*, in terms of the phenomena of the natural world, does or can exist. The needful solution was effected by Darwin. The "urpflanze" of Goethe, the types of Cuvier, and

the like, at once became intelligible as schematic representations of ancestral organisms, which, in various and varying environments, have undergone differentiation into the vast multitude of existing forms. All the enigmas of structure become resolved; "representative" and "aberrant," "progressive" and "degraded," "synthetic" and "isolated," "persistent" and "prophetic" types no longer baffle comprehension; conformity to type represented by differentiated or rudimentary organs in one organism is no longer contradicted by their entire disappearance in its near allies, while systematist and morphologist become related simply as specialist and generalizer, all through this escape from the Linnæan dogma of the fixity of species. The phenomena of individual development receive interpretation in terms of ancestral history; and embryology thus becomes divided into ontogeny and phylogeny, the latter, too, coming into intimate relation with palæontology, while classification seeks henceforth the reconstruction of the genealogical tree. All these results were clearly developed in the most important work of the new period, Haeckel's *Generelle Morphologie* (1866), while the valuable contemporaneous *Principles of Biology* of Herbert Spencer also gave special attention to the relation of morphology to physiology.

MORRIS, ROBERT, American statesman, was born at Liverpool, England, on January 20, 1734. At the age of thirteen he accompanied his father to America, and after serving in a counting-house at Philadelphia he became in 1754 partner in the business. From 1776 to 1778 he was delegate to the Continental Congress, and he was one of those who signed the Declaration of Independence. During the war he served on the committee of ways and means, and freely placed his immense wealth at the disposal of his country, his personal credit being at one time pledged to the amount of \$1,400,000. He also in 1780 established the bank of North America, and until 1784 acted as superintendent of finance. In 1786 he became a member of the Pennsylvania legislature, and he was one of the convention which framed the Federal constitution in 1787. From 1786 to 1795 he was United States senator. On account of the disastrous result of some of his financial speculations Morris passed the later years of his life in a debt prison. He died at Philadelphia, May 8, 1806. Robert Morris had as his assistant-superintendent of finance Gouverneur Morris (1752-1816), with whom he engaged also in several mercantile enterprises. Gouverneur Morris, who rose to some eminence as a statesman and orator, was more fortunate in his speculations than his colleague, and latterly became celebrated for the munificence of his hospitality. He was the author of a series of essays on currency and finance.

MORRIS-DANCE, or MORRICE-DANCE, a performance for a long time associated with certain festive seasons in England, but now wholly discontinued.

MORRISON, ROBERT, the first Protestant missionary to China, was born of Scottish parents at Morpeth, Northumberland, on January 5, 1782. He died at Canton on August 1, 1834. His *Memoirs*, compiled by his widow, were published in 1839.

MORRISTOWN, a city of the United States, county seat of Morris county, N. J., lies on the Whippany river, thirty-one miles from New York by the Morris and Essex division of the Delaware, Lackawanna, and Western Railroad. It was twice the headquarters of the American army during the War of Independence, and Washington's residence, owned by the Washington Association, assisted by the State, is a half-mile to the east. On Whatnong mountain, three miles distant, stands the State insane asylum, usually called Morristown Asylum, a vast granite build-

ing 1,243 feet long, erected in 1874-1875, and capable of accommodating 1,000 patients. The population in 1890 was 8,500.

MORSE, SAMUEL FINLEY BREESE, artist and inventor, was born at the foot of Breed's Hill, Charlestown, Mass., on April 27, 1791. His father was the Rev. Jedediah Morse, D.D., the author of Morse's *Geography*. At the age of fourteen Samuel Morse entered Yale College; under the instruction of Professors Day and Silliman he received the first impulse toward those electrical studies with which his name is mainly identified. In 1811 Morse, whose tastes during his early years led him more strongly toward art than toward science, became the pupil of Washington Allston, then the greatest of American artists, and accompanied his master to England, where he remained four years. His success at this period was considerable; but on his return to America in 1815 he failed to obtain commissions for historical paintings, and after working on portraits for two years at Charleston, S.C., he removed first to Washington and afterward to Albany, finally settling in New York. In 1825 he laid the foundations of the National Academy of Design, and was elected its first president, an office which he filled until 1845. The year 1827 marks the revival of Morse's interest in electricity. It was at that time that he learned from Prof. J. F. Dana of Columbia College the elementary facts of electromagnetism. As yet, however, he was devoted to his art, and in 1829 he again went to Europe to study the old masters.

The year of his return, 1832, may be said to close the period of his artistic, and to open that of his scientific life. On board the packet-ship *Sully*, which sailed from Havre October 1, 1832, while discussing one day with his fellow-passengers the properties of the electromagnet, he was led to remark: "If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted by electricity." It was not a novel proposition, but the process of formulating it started in his mind a train of new and momentous ideas. The current of electricity, he knew, would pass instantaneously any distance along a wire; and if it were interrupted a spark would appear. It now occurred to him that the spark might represent a part of speech, either a letter or a number; the absence of the spark, another part; and the duration of its absence, or of the spark itself, a third, so that an alphabet might be easily formed, and words indicated. In a few days he had completed rough drafts of the necessary apparatus, which he displayed to his fellow-passengers. During the twelve years that followed Morse was engaged in a painful struggle to perfect his invention and secure for it a proper presentation to the public. The refusal of the government to commission him to paint one of the great historical pictures in the rotunda of the Capitol seemed to destroy all his old artistic ambition. In poverty he pursued his new enterprise, making his own models, molds, and castings, denying himself the common necessities of life and encountering embarrassments and delays of the most disheartening kind. It was not until 1836 that he completed any apparatus that would work, his original idea having been supplemented by his discovery in 1835 of the "relay," by means of which the electric current might be reinforced or renewed where it became weak through distance from its source.

Finally, on September 2, 1837, the instrument was exhibited to a few friends at his room in the university building, New York, where a circuit of 1,700 feet of copper wire had been set up, with such satisfactory results as to awaken the practical interest of the Messrs. Vail, iron and brass workers in New Jersey, who thence-

forth became associated with Morse in his undertaking. Morse's petition for a patent was dated September 28, 1837, and was soon followed by a petition to Congress for an appropriation to defray the expense of subjecting the telegraph to actual experiment over a length sufficient to establish its feasibility and demonstrate its value. The committee on commerce, to whom the petition was referred, reported favorably. Congress, however, adjourned without making the appropriation, and meanwhile Morse sailed for Europe to take out patents there. The trip was not a success. In England his application was refused on the alleged ground that his invention had been already published; and, while he obtained a patent in France, it was subsequently appropriated by the French government without compensation to himself. His negotiations also with Russia proved futile, and after a year's absence he returned to New York. On February 23, 1843, Congress passed the long-delayed appropriation, steps were at once taken to construct a telegraph from Baltimore to Washington, and on May 24, 1844, it was used for the first time. Morse's patents were already secured to him and his associates, and companies were soon formed for the erection of telegraph lines all over the United States. In the year 1847 Morse was compelled to defend his invention in the courts, and successfully vindicated his claim to be called the original inventor of the electromagnetic recording telegraph. Thenceforward Morse's life was spent in witnessing the growth of his enterprise and in gathering the honors which an appreciative public bestowed upon him. As years went by he received from the various foreign governments their highest distinctions, while in 1858 the representatives of Austria, Belgium, France, the Netherlands, Piedmont, Russia, the Holy See, Sweden, Tuscany, and Turkey appropriated the sum of 400,000 francs in recognition of the use of his instruments in those countries. In the preparations for laying the first Atlantic cable he took an active part, though the attempt of 1857, in which he personally engaged, was not successful. He died April 2, 1872, at New York, where his statue in bronze now stands in the Central Park. His instrument and alphabet are now used on 95 per cent. of the telegraph wires of the world.

MORSHANSK, a district town of Russia, situated in the government of Tamboff, 58 miles (187 miles by rail) to the north of the capital of the province, on the Tsna river, a tributary of the Oka, and on the railway between Moscow and Orenburg. Population, 20,000.

MORTALITY TABLES. See INSURANCE.

MORTGAGE. The general object of mortgage is to secure a money debt by making it a charge on land, so that, if the debt be not paid by a time agreed upon between the parties, the creditor may sell the land and pay himself out of the proceeds. In English law this is done by a conveyance of the land in absolute terms to the creditor, subject only to its being defeated if the debt should be paid at the time fixed; an arrangement to which the law has attached peculiar incidents designed to carry out its real object. An absolute conveyance, however, is by no means essential to the purposes of mortgage.

As to mortgages of personal property see PLEDGE.

In the United States there is great diversity in the extent to which equitable principles have been formally substituted for the rules of the common law in dealing with mortgages. Washburn arranges the States into three "pretty well defined classes." In the first, the mortgage deed is held to create a seizin of and an estate in the premises, with all its common law incidents, to be enforced if need be by ejectment. In the second, the mortgagee's rights are limited to such as the rules of

equity prescribe, and may not be enforced by a suit at law. In the third, the mortgagee's interest is not deemed an *estate* at all, but is here only to be enforced by the sale of the premises as a means of paying the debt. In the first class come Massachusetts, Maine, Connecticut, New Hampshire, Rhode Island, Vermont, Indiana, Missouri, North Carolina, Mississippi, Minnesota; in the second, Iowa, Illinois, Pennsylvania, Kentucky, Ohio, Wisconsin, and Texas; in the third, California, Georgia, and New York, to which may be added Oregon.

MORTIFICATION, a term used in surgery signifying a local death. Any cause which interferes with the blood-supply of a portion of the body will, if sufficiently prolonged or sufficiently severe, give rise to mortification. In some cases the death may be preceded by inflammation; in others, as in old people with diseased vessels, the part may die in consequence simply of insufficient blood-supply without any previous inflammation. The part is said to mortify; the process is termed gangrene; the dead part is called a slough. A severe injury may end in mortification. Extreme heat as in severe burns, or extreme cold as in frost-bite, may give rise to the condition. Those parts of the body farthest from the center of the circulation are most liable to mortification. Frost-bite, for example, may attack the toes or fingers as well as those parts which are most exposed to the cold, more particularly the point of the nose or the ears. The part affected becomes pale, bloodless, cold, and insensible. The great point to attend to is to restore the circulation gradually, using gentle friction. If the person is brought before a fire, or if any hot applications are used, then a rapid reaction may issue in a severe inflammation, which may be followed by mortification. Chilblain is a mild form of frost-bite occurring in young people with sluggish circulations, very often caused by sitting down before a strong fire with cold feet; any one suffering from cold feet or hands should take plenty of exercise, and if after a return from a sharp walk the feet remain cold the heat should be restored by rubbing with a rough towel.

MORTMAIN, STATUTES OF. The object and effect of these enactments are treated in the articles **CHARITY** and **CORPORATION**, (*q.v.*)

MORTON, JAMES DOUGLAS, fourth earl of, regent of Scotland, second son of Sir George Douglas of Pittendriech, was born at Dalkeith in 1530. He was accused by James Stewart, earl of Arran, of having taken part in the murder of Darnley, the father of the king, and being tried by a jury of sixteen peers, most of whom were his enemies, was condemned to death and beheaded on June 2, 1581.

MORVEAU. See **GUYTON DE MORVEAU**.

MOSAIC is the fitting together of many, generally small, pieces of marble, opaque glass, colored clays, or other substances, so as to form a pattern; the design may be of various degrees of elaboration, from the simplest, almost monochromatic, geometrical pattern to the most elaborate picture, with figure-subjects represented in colors of countless gradations.

The earliest existing specimens of mosaic belong to one of the less important branches of the art—namely, the ornamentation on a small scale of jewelry, ivory thrones, and other furniture, or more rarely of some elaborate architectural ornament. Most of this earliest sort of mosaic resembles in execution what are called *cloisonnée* enamels. In the Louvre and in the British Museum are preserved some very beautiful ivory carvings in low relief, some from Nineveh and others from Egypt, in which figures of deities, ornaments formed of the lotus and papyrus plants, and royal cartouches are enriched by small pieces of glass or lapis-lazuli and

other gem-like stones, which are let into holes made in the ivory. Each minute piece is separated from the next by a thin wall or *cloison* of ivory about as thick as cardboard, which thus forms a white outline, and sets off the brilliance of the colored stones. The favorite pattern in this sort of work for decorating the larger surfaces appears to have been suggested by the feathers on a bird's wing. (See **IVORY**.)

Another, quite different sort of mosaic was known to the Egyptians of the Ptolemaic and Roman periods. This is made entirely of glass, and is extremely minute. The finest known specimen is in the British Museum; it is a small tablet about three-eighths of an inch square, apparently the bezel of a ring, on which is represented the sacred hawk—every feather on the bird's wing being produced with a great number of colors and tints, each quite distinct, and so minute that a strong magnifying glass is required to distinguish its details.

The way in which this wonderful little mosaic was produced is extremely ingenious. Numbers of long sticks of various-colored glass were arranged in such a way that their ends produced the figure of the hawk; other sticks of blue glass were placed all round so as to form the ground. The whole bundle of sticks of glass when looked at endwise now presented the figure of the hawk with a blue background, immensely larger than it afterward became. The bundle was then heated till the sticks melted together, and the whole thick rod, softened by fire, was then drawn out to a greatly diminished thickness. In this process the relative positions of the sticks of colored glass forming the design were not altered. A slice of the rod was then cut off, and its faces polished—the design, much reduced in size, of course being equally visible at both sides of the slice; and thus the microscopic minuteness of the mosaic was produced, with astonishing delicacy and refinement; many slices, each showing the same mosaic, could be cut from the same rod.

The more important use of mosaic has been on a large scale either for pavements or for walls and vaulted ceilings. Mosaic for these purposes has by many writers, both ancient and modern, been divided on various systems into classes; perhaps the simplest classification is the following: I. *For Pavements*: (a) *Tesselated*, in which the design is formed of small cubes, generally of marble, more rarely of glass or clay; (b) *Sectile*, formed of larger pieces of marble, shaped and cut so as to fit accurately one with another. II. *For Walls and Vaults*: *Fictile or vermiculated*; pieces of opaque glass, in small cubes, arranged so as to form complicated pictures.

Among the Romans the use of mosaic, both of marble and of opaque glass, was very extensive. According to Pliny, they derived this art from the Greeks, but not until the time of the Third Punic War, 146 B.C., while glass mosaics for walls were a recent invention in his time. Many of these have been found at Pompeii; most commonly they are used to decorate niches for fountains or statuettes.

Throughout England, Germany, France, Spain, Asia Minor, and Northern Africa in no way have signs of Roman occupation been left so clearly and in so conspicuous a form as by the numerous large and generally well-preserved mosaic pavements which have at various times been discovered in all these countries. In many cases, long after all traces of the walls of the buildings have disappeared, owing to their being dug up and removed for building purposes, the mosaics still remain to testify of the artistic power and mechanical skill of the Roman colonists.

The *Medieval Mosaics* may be divided into four principal classes: (I) those used to decorate walls and

vaults, made of glass tubes; (2) those for pavements, made of marble, partly in large shaped pieces, and partly in small tesserae; (3) glass in small pieces, either rectangular or triangular, used to enrich marble pulpits, columns, and other architectural features; (4) wood mosaics.

The wall mosaics were, in their origin, purely Byzantine, and appear to date from the beginning of the fifth century. They are made of colored glass, rendered opaque by the addition of oxide of tin.

MOSCHELES, IGNAZ, one of the most refined and accomplished pianists of the present century, was born at Prague, May 30, 1794. He died March 10, 1870.

MOSCHUS, of Syracuse, is one of the Greek bucolic poets; he was a friend of the Alexandrian grammarian Aristarchus, (about 200 B.C.) His chief work is the epitaph of Bion of Smyrna, another of the bucolic poets, who seems to have lived in Sicily. It is probable that the miscellaneous collection of poems which we possess by the three poets Theocritus, Bion, and Moschus was known to Artemidorus in 200 B.C.

MOSCOW, a government of Central Russia, bounded by Tver on the northwest, Vladimir and Ryazan on the east, Tula and Kaluga on the south, and Smolensk on the west, and having an area of 12,858 square miles. The surface is undulating, with broad depressions occupied by the rivers, and varies in elevation from 500 to 850 feet. Moscow is situated in the center of the so-called Moscow coal-basin, which extends into the neighboring governments. The carboniferous formation is covered with Jurassic clays, sandstones, and sands, which yield a good china-clay at Gjeli, copperas, a sandstone much employed for building, and a white sand used for the manufacture of glass. The whole is thickly covered with boulder-clay and alluvial sands.

The government is watered by the Volga, which skirts it for a few miles on its northern boundary, by the navigable Sestra, which brings it in communication with the canals leading to St. Petersburg, by the Oka, and by the Moskva. Large quantities of grain, metals, glassware, skins, and other commodities are shipped up and down the Moskva, while the Myachkovo stone quarries situated on its banks supply the capital with building stone. There are several marshes, mostly in the north, where also, as well as in the northeast, notwithstanding the immense consumption of wood in manufactures and for use in the capital, extensive forests are still found.

The population, 1,581,700 in 1864, numbered 1,913,700 in 1873, one-third being urban. They are nearly all Great-Russians, and belong to the Greek Church, or are nonconformists. The chief centers of trade are Moscow, Kolomna, Serpukhoff, Bogorodsk, Serghievsk, and Pavlovsk. There are 125 fairs. Transport is much facilitated by railways, and by good highroads radiating from the capital. Moscow is divided into thirteen districts, the chief towns with their respective populations being—Moscow (753,469), Bogorodsk (6,600), Bronnitsy (3,500), Ruza (4,000), Kolomna (18,800), Serpukhoff (16,800), Podolsk (11,000), Zvenigorod (7,800), Mojaisk (4,200), Volokolamsk (3,000), Klin (6,700), Dmitroff (7,600), and Vereya (5,500). In addition to these administrative centers may be mentioned Voskresensk (6,000), Serghievski Posad (27,500), in the neighborhood of the monastery of Troitsa, a rich commercial and industrial town, and Pavlovski Posad (4,500). Many of the villages are far more important from their industries and trade than the district towns.

MOSCOW (Russian, *moskva*), the second capital of the Russian empire and chief town of the government and district of the same name, on both banks of the river Moskva, a tributary of the Oka, at its confluence

with the rivulet Yauza. The popular idea is that Moscow is built on seven hills, and in fact the city covers several eminences, the altitudes of its different parts varying from 500 to 850 feet above the level of the sea. It is 400 miles from St. Petersburg, 813 from Archangel, 900 from Ufa, 938 from Astrakhan, 933 from Odessa, and 811 from Warsaw. It lies to the north of the most densely-peopled parts of Russia (the "black-earth region"), while the country to the north of it is rather thinly peopled as far as the Volga, and very sparsely beyond that. The space between the middle Oka and the Volga, however, was the very cradle of the Great-Russian nationality (Novgorod and Pskov excluded); and four or five centuries ago Moscow had a quite central position with regard to this.

The present city measures seven miles from north to south, and nine miles from west-southwest to east-northeast, and covers an area of thirty-two square miles (about forty when the suburbs are included). In the center, on the left bank of the Moskva, stands the "Kreml" or Kremlin, occupying the Borovitsky hill, which in the twelfth century was covered by a dense forest. To the east of the Kremlin is the Kitay-Gorod, formerly the Great Posad, the chief center for trade. The Byelyi-Gorod, which was formerly inclosed by a stone wall (whence the name), surrounds the Kremlin and the Kitay-Gorod on the west, north, and northeast. A line of boulevards now occupies the place of its wall, (destroyed in the eighteenth century), and forms a first circle of streets around the center of Moscow. The Kremlin is an old fort of pentagonal (nearly triangular) shape, ninety-eight acres in extent, occupying a hill about 100 feet above the level of the Moskva. It is inclosed by a high stone wall 2,430 yards in length, restored during the present century, and having eighteen towers. Its five gates are surmounted by high towers.

Of the sacred buildings of the Kremlin the most venerated is the Uspensky cathedral. The former church of this name was erected in 1326 by Ivan Kalita, but, on its falling into disrepair, a new one was built on the same place in 1475-1479, by Fioraventi, in the Lombardo-Byzantine style, with Indian cupolas. It was restored in the eighteenth century and in 1813.

The great palace of the emperors, erected in 1849, is a fine building in white stone with a gilded cupola. It contains the *terems*, or rooms erected for the young princes in 1636 (restored in 1836-1849, their former character being maintained), a remarkable memorial of the domestic life of the czars in the seventeenth century. In the treasury of the czars, Granovitaya Palata and Orujeynaya Palata, now public museums, the richest stores connected with old Russian archæology, are found—crowns, thrones, dresses, various articles of household furniture belonging to the czars, Russian and Mongolian arms, carriages, etc.

The four sides of the Senate Square are occupied by buildings of various dates, from the fifteenth century onward. The senate, now the law courts, was erected by Catherine II. Facing it is the arsenal, containing full ammunition for 200,000 men.

The Kitay-Gorod, which covers 121 acres, and has 20,000 inhabitants, is the chief commercial quarter of Moscow. It contains the Gostinoy Dvor, consisting of several stone buildings divided into 1,200 shops, where all kinds of manufactured articles are sold. The "Red Square," 900 yards long, whose stone tribunal was formerly the forum, and afterward the place of execution, separates the Gostinoy Dvor from the Kremlin. At its lower end stands the fantastic Pokrovsky cathedral (usually known as Vasili Blajennyi), which is the wonder of all strangers visiting Moscow, on account of its towers; all differing from each other, and represent-

ing, in their variety of colors, pineapples, melons, and the like. It was built under Ivan the Terrible by an Italian. The exchange, built in 1838 and restored in 1873, is very lively, and its twenty-three "exchange artels" (associations of nearly 2,000 brokers, possessing a capital of more than \$500,000) are worthy of remark. Banks, houses of great commercial firms, streets full of old bookshops carrying on a very large trade, and finally the Tolkuchy rynok, the market of the poorest dealers in old clothes, occupy the Kitay-Gorod, side by side with restaurants of the highest class. In the Kitay-Gorod are also situated the house of the Romanoffs, rebuilt in 1859 in exact conformity with its former shape; a Greek monastery; and the printing-office of the synod, containing about 600 MSS. and 10,000 very old printed books, together with a museum of old typographical implements.

The northern parts of the Byelyi-Gorod are also the center of a lively trade. Here are situated the Okhotnyi Ryad (poultry market), and the narrow streets Tverskaya and Kuznetsky-Most, the rendezvous of the world of fashion. Here also are the theaters. In the southwest of the Byelyi-Gorod, opposite the garden of the Kremlin, stand the university, the public museum, and the military riding school.

The Zemlyanoy-Gorod, which has arisen from villages that surrounded Moscow, exhibits a variety of characters. In the neighborhood of the railway stations it is a busy center of traffic; other parts of it are manufacturing centers, while others—as, for instance, the small quiet streets in the west of the boulevard of Prechistenka, called the old Konushennaya, with their wooden houses and spacious yards—are the true abodes of the families of the old, for the most part decayed, but still proud nobility. The Zamoskvoryechny, on the right bank of the Moskva, is the abode of the patriarchal merchant families. Each house is surrounded by a yard whose gate is rarely opened, and each house, with its dependencies and gardens, bears the character of a separate estate. Population of the city, 753,469. Since the fourteenth century it has been an important commercial city.

MOSELLE. See RHINE.

MOSER, JOHANN JAKOB, jurist, was born at Stuttgart on January 18, 1701. He died in 1785.

MOSES. Of the life of Moses we have few certain details, though the history of Israel bears witness to the importance of his work. To what has been said under ISRAEL there will here be added a brief summary of what has been handed down about him. His origin and the history of his childhood can be read in Exod. i., ii.; the statements there given are enlarged and modified in the Jewish Midrash, particularly as we find it in Josephus and Philo. The daughter of Pharaoh, we are told, was called Thermutis or Merris; she named the boy Moyses, not because she used the Hebrew verb *Moshē* to express the fact that he was drawn out of the water, but because the Egyptian word for water was *mo*, and *yse* applies to those who have been delivered from it. She took care to have him trained in all the wisdom of the Egyptians and in that of the Greeks, Assyrians, and Chaldeans as well. To his great intellectual endowments corresponded his personal beauty, of which Josephus speaks in extravagant terms. It was on account of his beauty that, when on one occasion, as a young man, he led an Egyptian army against Meroe, the Ethiopian princess Tharbis opened the gates of the capital to him in order to make him her husband.

For reasons explained in Exod. ii. 11 sq., Moses left the land of Pharaoh and came to Midian to the Kenite priest Jethro (also called Hobab Ben Raguel and Rag-

uel), whose daughter Zipporah he married, becoming by her the father of two sons, Gershom and Eliezer. During his stay in Midian he received, at the foot of Sinai (Horeb), the divine revelation at the burning bush whereby he was called to become the liberator of Israel from Egyptian bondage. With much reluctance he at last accepted this vocation, and, already expected by his brother Aaron and the elders, returned to his people. Arrived in Egypt, he associated Aaron with him as his interpreter, being himself no orator, but a man of counsel and action, and appeared before Pharaoh to demand of the king in Jehovah's name permission for the people to go with flocks and herds into the wilderness to celebrate there a festival (the spring festival of the Passover) in honor of their God. Jehovah gave emphasis to the demand by great signs and wonders—the plagues of Egypt, which have their explanation for the most part in evils to which Egypt is periodically liable, but are treated by Israelite tradition as the weapons of Jehovah in his ever-intensifying conflict with the king and the gods of Egypt. At length, by the slaying of the first-born, the stubbornness of Pharaoh was broken, so that he consented to, and even urged, the departure of the Hebrews. By and by, however, he changed his mind, and, setting out in pursuit of the Hebrews, overtook them at the Red Sea; but Jehovah fought for them, and annihilated Pharaoh's chariots and all his host.

By the miracle wrought at the Red Sea Moses was pointed out to the Hebrews as the man of God, to whom accordingly they now committed the task of caring for their outward life as well as their spiritual guidance. He led them first to Sinai, where the law was revealed and the worship in connection with the ark of the covenant instituted. When he had communed face to face with the Godhead for forty days on the holy mountain, the skin of his face shone so that he had to wear a veil (hence the horns, properly rays, on his forehead). Driven from Sinai in consequence of their worship of the golden calf, the Israelites removed to Kadesh with the view of entering Palestine. But this plan was defeated by their unbelief and faintheartedness, and, as a punishment, they were compelled to sojourn forty years in the wilderness of Kadesh (Paran, Sin). It was here and now that the people went to school with Moses; here, at the sanctuary of the camp, he declared law and judgment; and here, according to the view of the oldest tradition, the foundations of the Torah were laid. The region of Kadesh was also the scene of almost all the miracles and other circumstances we read about Moses. Here he showed himself to be at once the father and mother of the people, their judge, priest, and seer. It was not till toward the very close of his life that he led the Israelites from Kadesh into northern Moab, which he wrested from the Amorite king, Sihon of Heshbon. Here he died on Mount Pisgah or Nebo, after taking leave of the people in the great legislative address of Deuteronomy.

MOSES OF CHORENE was a native of Khor'ni in Tarôn, a district of the Armenian province of Turuberan. According to the only trustworthy authority—the *History of Armenia* which bears his name—he was a pupil of the two fathers of Armenian literature, the patriarch or catholicos Sahak the Great and the vartabed Mesrôb.

Of the works of Moses the best known is the *History of Armenia*, or, as the more exact title runs, the *Genealogical Account of Great Armenia*.

MOSHEIM, JOHANN LORENZ VON, well known as a church historian, but also distinguished in his day as a master of eloquence, was born at Lübeck on October 9th. There is some uncertainty as to the year, but the

probability is in favor of 1693 or 1694. He died at Göttingen on September 9, 1755, shortly after the completion of a new and greatly improved edition of his *Church History*.

MOSQUE (*Jámi'*, or more fully, *Masjid Jámi'*, the place of congregational prayer). Owing to the almost complete absence of ritual in the Moslem worship, the mosque, at least in its earlier forms, is one of the simplest of all religious buildings—its normal arrangement being an open court surrounded by a covered cloister, in the center of which is a cistern for the ablutions requisite before prayer; the side of the mosque which is toward Mecca is occupied by a roofed building or place reserved for prayer, sometimes screened off from the court, but frequently quite open toward it. In the center of this sanctuary is a niche showing the direction of Mecca; and by the side of the niche is a lofty pulpit. In front of the pulpit is a raised platform from which certain exhortations are chanted, and near it one or more seats and lecterns combined from which chapters of the Koran are read to the people.

Minarets were not built during the first half century after the Flight, but now as a rule no mosque is without at least one. From the upper gallery of this the *Moedhdhin* announces to the faithful the times for prayer—five times during the day, and twice at night. Blind men are generally selected for this office, so that they may not overlook the neighboring houses.

Most mosques have endowed property, which is administered by a warden (*Názir*), who also appoints the imáms and other officials. The larger mosques have two imáms; one is called (in Arabia and Egypt) the *Khatíb*, and he preaches the sermon on Fridays (the Moslem Sabbath); the other, the *Rátib*, reads the Koran, and recites the five daily prayers, standing close to the *Mihráb*, and leading the congregation, who repeat the prayers with him, and closely follow his postures. The imáms do not form a priestly sect; they generally have other occupations, such as teaching in a school or keeping a shop, and may at any time be dismissed by the warden, in which case they lose the title of imám. Doorkeepers and attendants to sweep the floor, trim the lamps, and perform other menial offices, are attached to each mosque, in numbers varying according to its size and endowment. Moslem women, as a rule, are expected to say their prayers at home, but in some few mosques they are admitted to one part specially screened off for them. This is the case in the mosque Sitta Zainab in Cairo. In the Aksá mosque at Jerusalem, there is a latticed balcony for the women, who can see without being visible to the male worshippers below.

The greatest possible splendor of both material and workmanship is often lavished on the building and its fittings. The whole outside is frequently decorated with the most elaborate surface-carving in stone or marble, the pavement of the richest marbles inlaid in intricate patterns, the walls paneled in a similar way, or decorated with the most minute mosaics of glass, mother-of-pearl, agates and other costly stones. The central niche and the pulpit are of special magnificance; and if the latter is of wood it is often covered with delicate ivory carvings, and inlay of pearl and ebony. Very beautiful surface-ornament, executed in hard stucco, and enriched with gold and colors, is used to decorate arches, wall-surfaces, and the pendentives of domes, which latter generally have the so-called "stalactite" form of ornament—one of great beauty and complexity. The woodwork of doors, screens, and ceilings is frequently very gorgeous with carving, inlay, and elaborate painting; the whole of the doors outside are often covered with very delicate pierced and embossed work in

bronze, or more rarely iron. The magnificent tiles from Persia, Damascus and Rhodes, enameled in brilliant blue, green, and red, on a white ground, are often used to cover the walls. Traceried windows in pierced marble or stucco work often occur; these are filled with brilliant colored glass, always in very small pieces, forming a transparent mosaic of jewel-like richness. Lamps of enameled glass, or of bronze inlaid with silver, were once common, but are now rapidly disappearing.

Some mosques, especially the Karúbin mosque at Fez in Morocco, possess a collection of magnificent illuminated MSS., chiefly copies of the Koran and other religious books; in the large collection at Fez, MSS. of Aristotle's *Natural History*, with the works of Averroes and other commentators, exist in considerable number; some few of the MSS. are as early as the tenth century.

MOSQUITO (sometimes written "Mosquita"), a Spanish word signifying "little fly," is a name popularly applied to certain annoying dipterous insects, and, strictly speaking, it should probably be used only for species of *Culicidæ* (and for the genus *Culex* in particular), for which "gnat" is the English synonym; but in many countries it is by almost common consent applied to all small dipterous insects that suck human blood, and therefore includes what we know as "sand-flies," "midges," etc., of the genera *Ceratopogon*, *Simulium*, and others. A distinction is often falsely drawn between "mosquito" and "gnat," the former being supposed to represent an insect native chiefly of hot climates, whereas the latter is our own too-well-known pest. In effect the terms are really synonymous, and any actual difference can only be specific. The "mosquitoes" of high northern latitudes may be species both of *Culex* and of *Simulium*.

Accounts of the numbers of these insects in tropical countries and in high latitudes, and of their irritating attacks, are to be met with—seldom exaggerated—in most books of travel. It is only the female that bites; and, as it is but a very small proportion of them that can ever taste human blood or that of any warm-blooded animal, blood would not appear to be essential to their welfare. It has been suggested that warm blood may have an influence on the ova, but it cannot be supposed that the eggs of those multitudes of individuals that never get a chance to taste blood are necessarily infertile; everything tends to prove the opposite.

MOSQUITO COAST. See NICARAGUA.

MOSSÉS, or MUSCI, one of the two divisions of the botanical class *Muscineæ*, which includes also the Liverworts or *Hepaticæ*.

MOSSLEY, a manufacturing town of Lancashire, England, is situated on the London and Northwestern Railway and on the Huddersfield canal, near the west bank of the Tame, which here separates Lancashire from Cheshire, three miles northeast of Ashton-under-Lyne, and ten east-northeast of Manchester. The total population was 13,372 in 1881.

MOSTAR, the chief town of Herzegovina, is built on both banks of the Narenta, about thirty-five miles from its mouth, and forty miles southwest of Seraievo (Bosna Serai), the capital of Bosnia.

MOTANABBI, or MOTENEBBI. Abú 'l-Tayyib Ahmed ibn al-Hosain of Cufa, called Al-Motanabbi is the most famous representative of the last period of Arabic poetry, though some Eastern critics place him below Abú Tammám. Born about 916; died, 965.

MOTHER-OF-PEARL. The shells of many molluscous animals display a brilliant pearly and iridescent luster, resulting from the peculiar manner in which the layers of calcareous matter of which they are composed

have been successively formed. Such shells, even when small in size, form bright and, specially to the untutored eye, attractive ornaments, and as such are used for necklaces and similar purposes. When the shells are of sufficient size to cut and shape for purposes of utility, they become an article of some commercial importance under the name of Mother-of-Pearl. This term, though applicable to all pearly shells, is in commerce principally applied to the shells of the bivalve pearl-mussel *Meleagrina margaritifera*, which is the principal source of the commercial product. The largest and steadiest consumption of mother-of-pearl is in the button trade, and much is also consumed by cutlers for handles of fruit and dessert knives and forks, pocket-knives, etc. It is also used in the inlaying of Japanese and Chinese lacquers, European lacquered papier-mâché work, trays, etc., and as an ornamental inlay generally. In an innumerable variety of small and fancy articles mother-of-pearl is also employed, its use being limited only by the moderate dimensions and thickness of material obtainable, and its rather brittle nature. The carving of pilgrim shells and the elaboration of crucifixes and ornamental work in mother-of-pearl is a distinctive industry of the monks and other inhabitants of Bethlehem. Among the South Sea Islands the shell is largely fashioned into fishing-hooks, a purpose for which its brilliant conspicuous appearance appears to render it suitable without the addition of any bait or other lure.

MOTHERWELL, a police burgh of Lanarkshire, Scotland, is situated on the Caledonian Railway, a short distance from the right bank of the Clyde, two miles northeast of Hamilton and eleven east-southeast of Glasgow. The village, which takes its name from an old well dedicated to the Virgin, contained only 900 inhabitants in 1851, and owes its rapid increase to the coal and iron mines in the neighborhood. It possesses one of the largest ironworks in Scotland, and also extensive engineering works. Population about 20,000.

MOTHERWELL, WILLIAM, poet, antiquary, and journalist, born in Glasgow, 1797, rendered service in the collection of fugitive border poetry and wrote one or two very touching songs in the Scotch dialect, dying in 1835, before he had fulfilled the promise of his earlier work.

MOTHS. See BUTTERFLIES.

MOTLEY, JOHN LOTHROP, the well-known historian of the Dutch Republic, was born April 15, 1814, at Dorchester, now a part of Boston, Mass., and from 1827 was educated at Harvard, where he graduated in 1831. He then studied for two years at Göttingen and Berlin, and after a period of European travel, chiefly in Italy, returned to America in 1834, where he became a student of law, and ultimately was called to the bar. In 1837 he married, and two years afterward he published anonymously his earliest literary work, a two-volume novel, entitled *Morton's Hope, or the Memoirs of a Young Provincial*, which attained, and indeed deserved, only a moderate success. In 1841 he received his first diplomatic appointment, being made secretary of legation to the Russian mission, but, finding the atmosphere of St. Petersburg uncongenial, he resigned his post within a few months and definitely resolved on a literary career. Besides contributing various historical and critical essays to the *North American Review*, he published in 1849, again anonymously, a second novel entitled *Merry Mount, a Romance of the Massachusetts Colony*. About the year 1846 the project of writing a history of Holland had begun to take shape in his mind, and he had already prepared a considerable quantity of MS., when, finding the materials at his disposal in the United States quite inadequate for the completion of his work, he resolved to migrate to Europe along with

his family in 1851. The next five years were spent at Berlin, Dresden, Brussels, and the Hague in laborious investigation of the archives preserved in those capitals, and resulted in 1856 in the publication of *The Rise of the Dutch Republic, a History* (London and New York, 3 vols. 8vo). This work, which, after a large historical introduction, minutely follows the history of the Low Countries from the abdication of Charles in 1555 down to the assassination of William the Silent in 1584, immediately became highly popular by its graphic manner and the warm and sympathetic spirit in which it was written, while at the same time it was frankly recognized by scholars as a painstaking and conscientious piece of original work. It speedily passed through many English editions, was translated into French in 1859, and also into Dutch, as well as into German and Russian. Pursuing his researches in England, France, Belgium, and Holland, Motley was able to publish in 1860 the first two volumes of the *History of the United Netherlands*, covering the period from the death of William the Silent in 1584 to shortly after the destruction of the Armada, by which the Spanish project for subjugating England and reconquering the Netherlands was finally defeated. This work, which was on a somewhat larger scale than the preceding, embodied the results of a still greater amount of original research, not only in the Dutch archives, in the copies of the Simancas archives, and in the portions of those archives still retained in Paris, but also in the London State Paper Office, and in the MS. department of the British Museum. By two new volumes published in 1868 the work was brought down to the twelve years' truce in 1609, and it was announced that the author was engaged in writing a continuation which should embrace the history of the Thirty Years' War. Meanwhile Motley from the close of 1861 to 1867 had held the post of United States minister at Vienna; in 1869 he was appointed to a similar position at the court of St. James, but was recalled in 1870. After a short visit to Holland he again took up his residence in England, where *The Life and Death of John Barneveld, Advocate of Holland, with a view of the primary Causes of the Thirty Years' War* (2 vols.) appeared in 1874. Ill health now began to interfere with sustained literary work, and after a protracted period of failing vigor, he died at Kingston Russell House, near Dorchester, Dorsetshire, on May 29, 1877.

MOTMOT, according to Hernandez in his *Historia Avium Novæ Hispaniæ*, published at Rome in 1651, was the Mexican name of a bird which he described well enough to leave no doubt as to what he meant; but the word being soon after printed *Momot* by Nieremberg and others gave rise to the Latinized *Momotus*, invented by Brisson as a generic term, which has since been generally adopted by ornithologists, though *Motmot* has been retained as the English form. The *Motmots* have been for many years recognized as forming a distinct family, *Momotidæ* or *Prionitidæ*, of the heterogeneous assemblage known as *Picariæ* or *Coccygomorphæ*. In outward appearance they have an undoubted resemblance to Bee-eaters, but, though beautiful birds, various shades of blue and green predominating in their plumage, they do not exhibit such decided and brilliant colors; and, while the Bee-eaters are only found in the Old World, the *Motmots* are a purely Neotropical form, extending from southern Mexico to Paraguay, and the majority of species inhabit Central America. They are said to be solitary birds, or at most living in pairs, among the gloomy forests, where they sit on the underwood nearly motionless, or only jerking their long tail as the cry "houtou," or something like it, is uttered. Their ordinary food is small reptiles, insects, and fruits. The nest of one species, as observed by Mr. Robert

Owen, and is at the end of a hole bored in the bank of a watercourse, and the eggs are pure white and glossy. Little else has been recorded of their ways.

MOTRIL, a town of Spain in the province of Granada, is charmingly situated at the foot of an offshoot of the Sierra Nevada, on the edge of a rich alluvial plain about a mile from the Mediterranean and forty miles south-southeast from Granada, with which it is connected by a good carriage road. The population of Motril in 1888 was 17,000. The harbor (El Puerto de Motril) lies about six and one-half miles to the south-eastward at the village of Calahonda.

MOTT, VALENTINE, an eminent American surgeon, was born at Long Island, N. Y., on August 20, 1785. He graduated at Columbia College, studied under Sir Astley Cooper in London, and also spent a winter in Edinburgh. After acting as demonstrator of anatomy he was appointed professor of surgery in Columbia College in 1809. From 1811 to 1834 he was in very extensive practice as a surgeon, and most successful as a teacher and operator. He tied the innominate artery in 1818; the patient lived twenty-six days. He performed a similar operation on the carotid forty-six times with good results; and in 1827 he was also successful in the case of the common iliac. He is said to have performed 1,000 amputations and 165 lithotomies. After spending seven years in Europe (1834-1841) Mott returned to New York and founded the university medical college of that city. He translated Velpeau's *Operative Surgery*, and was foreign associate of the Imperial Academy of Medicine of Paris. His death occurred on April 26, 1865.

MOTTEVILLE, FRANÇOISE BERTAUT, MADAME DE, was born in 1621. She died December 29, 1689. Some letters of hers are preserved, especially a curious correspondence with "La Grande Mademoiselle" on marriage, but her chief work is her *Mémoires*, which are in effect a history of Anne of Austria, written briefly till the date of Madame de Motteville's return to court, and then with fullness.

MOUKDEN. See MANCHURIA.

MOULINS, chief town of the French department of Allier, is situated 195 miles by rail south-southeast from Paris on the right bank of the Allier, which is here crossed by a remarkable bridge about 1,000 feet in length, consisting of thirteen semicircular arches. The town, which stands at an altitude of about 740 feet above sea-level, is adorned with gardens and fine boulevards, and still contains several buildings of historical interest and many houses of the Middle Ages. Among other objects of interest in Moulins are some remains of the old chateau of the dukes of Bourbon, and the clock tower. The library of nearly 25,000 volumes contains a manuscript Bible of the twelfth century which was used at the council of Constance in 1415. There are no industries of importance, except the manufacture of wire ropes for mines, and of sulphate of barium. The population in 1881 was 21,126.

MOULMEIN. See MAULMAIN.

MOUND BUILDERS. For a vast distance, covering a stretch of country extending from the Appalachian range on the east to the Rocky Mountains on the west, and from Canada to the Gulf of Mexico, in short throughout the whole valley watered by the Mississippi system, there are found hillocks of earth, tumuli, or mounds, the questions of the object of which and who were their builders, must ever remain undecided. In view of their mode of construction and their contents, the proposition that they were built by the races inhabiting America when this continent came within the ken of history, seems negatived. These mounds, unlike those usually found as the relics of barbarous, extinct races, are not

confined to any one particular purpose—not only bearing evidence of having been used for sepulture, but for almost every purpose likely to be required by the exigencies of primitive life.

The States of Illinois, Missouri, and Ohio are particularly rich in these remains. Indeed, so numerous are they in the vicinity of St. Louis that the place has been dubbed the "Mound City." The Gulf States also contain large numbers of these mounds, while occasional specimens are found east of the Alleghanies and west of the Rockies—but the great Mississippi valley was the home *par excellence* of the mound builders. These mediate lands seem to have been the home of a race whose civilization was far beyond that of the Indians we have knowledge of, and whose existence was continually threatened by their more savage neighbors, and was one continuous struggle for self-preservation. This race seems to have been beset both on the east and west, for on the west, among the mountain fastnesses of the Rockies, we find the tenantless homes of the cliff-dwellers, which the former race had used as fortresses for protection, while as we approach the Alleghanies we find an increasing number of defensive mounds, the deduction being that the enemies of the denizens of the Mississippi valley inhabited and made their strongholds amidst the two great mountain regions of the continent, from the fastnesses of which they descended in continual forays against their lowland neighbors. Who are the representatives of these two races, and which survived the contest?

These defensive mounds are usually built in positions which give them strategic importance—such as tops of hills, on river bluffs—always near water supply. Their disposition is such as would indicate that they were not merely temporary intrenchments or fortifications, but that they were intended as permanent garrison points to hold in check any invaders of the lands inhabited by the builders. Judging from the sites usually selected, it would appear that these were the regions along the water courses, while the localities more remote, were a sort of Tom Tiddler's ground, belonging to neither party, the possession of which was disputed by both. The fortifications are of various shapes and are skillfully disposed—some authorities claiming to be able to trace a concatenation of these strongholds running in a continuous line from New York to Ohio. The race which built them was evidently endowed with high qualifications of skill and patience. One of the most conspicuous of these mounds is Fort Ancient, near the Little Miami River, Ohio. It is situated at the top of a steep acclivity, the walls being of a tough clay, ranging in height from five to twenty feet, according to the strength of the spot to be defended. They inclose a space little over 100 acres in extent, yet they measure over five miles in length, so serpentine is their course. It is divided into two portions, each portion being tenable in case of capture of the other. In the walls are numerous gates, and from large accumulations of stones found inside the fort it is supposed that these gates were barricaded in time of war with these stones. There are also numerous water reservoirs (connected with springs) in the interior of the fort. This fortress must have presented a formidable obstacle to an enemy. It is in general the counterpart of all the other defensive mounds, and its description will suffice for all of them. The largest mound of this kind is near Chillicothe, and incloses 145 acres. In connection with these defensive works are a number of high mounds evidently intended as observatories or watch-towers from which the motions of the enemy could be discerned.

Coming down into the lower levels of the valley we find a different species of mounds. They are not, as in

case of those occupying high places, irregular in shape, but are usually geometrical figures of uniform regularity, such as octagons, squares, etc. What their object was is unknown, and no satisfactory hypothesis has been offered. They have been called sacred mounds, but this appellation is purely fanciful. One of these aggregations of mounds is found at Newark, Ohio. It comprises an octagon of fifty acres, a square of thirty-five acres, and two circles, one of twenty-nine and the other of twenty acres. These are all joined by avenues and surrounded by ditches, and are semi-military in character; although probably defense was not the prime object in their erection, yet their construction, even if they were intended for religious purposes, gives evidence that the people were surrounded by enemies and were prepared for invasion and strife even in the midst of their worship. These mounds cover a space of four miles in length.

There is still another kind of mounds, found in these regions, to which the name of temple mounds has been given. The largest of this class is to be found at Cahokia, Ill. It measures 700x500 feet at the base and is 89 feet high. On one side is a terrace 160x300 feet. The summit is a level space 200x450 feet; this was surmounted by a small conical mound or altar 10 feet high, in which human bones and useful articles were found. A smaller series of mounds of kindred shape to these mentioned last are supposed to have been altars of sacrifice. They consist of strata of gravel, earth, and sand, covering fireplaces or hearths at the level of the ground. The mounds are seldom more than two feet in height. From the nature of the remains found in the vicinity of these mounds, the inference has been drawn that they were places for human sacrifice, although the argument for their being places of cremation would be equally good from the same premises.

The most numerous species of mounds, however, seem indubitably to have been places of sepulture. These vary in height and differ from the other mounds, in the fact that they are never found inside an inclosure. These mounds are rich in relics, which have thrown great light on the arts and manufactures of their builders, but give us nothing in regard to the history of their origin or their extinction. The largest mound of this class is Grave Creek Mound, near Wheeling, W. Va. It is 70 feet high and nearly 1,000 feet in circumference. It contained two chambers—an upper and lower. It was excavated in 1839, and three skeletons were found—two in one chamber and one in the other. A large number of beads were found also, together with a number of other articles. Various other mounds of like nature have been opened, and from the contents of some it has been argued that it was customary to sacrifice men and women on the occasion of the sepulture of a chief or prominent personage.

In some portions of the country mounds exist in the shape of animals. One of these—the Elephant mound in Grant county, Wis.—raises the interesting question as to where the builders of the mound obtained their model. Where did they see the elephant after which they fashioned the construction? In addition to the mounds mentioned above traces are found of other works, such as irrigation canals, and other agricultural devices, belonging to the same age and race. This in conjunction with other facts, indicates that the mound builders were an agricultural people, and derived their chief subsistence from this source. The articles found in the mounds lead us to believe that the race who built them had no inconsiderable share of civilization. The list includes pottery of various kinds, evincing a high degree of skill, besides other forms of earthenware.

Pipes of various kinds, some elaborately carved and made of various materials, are found in great numbers. Vases and jars of stone and masks of the human face, also testify to their knowledge of the sculptor's art. Copper seems to be the only mineral they possessed in general use. Stone implements abound in great variety. The question then arises, who were the mound builders? This question no man can yet answer, although archæologists claim they are slowly working out the clew to the mystery. In the light of the present the most tenable theory is that they were identical in race with our present Indians, but different in habits, and that they were finally overcome and extinguished by their more warlike neighbors—the "hunting tribes," whose descendants we have yet with us in the person of the present savage.

MOUNTAINS. For mountains in general see **GEOLOGY**. The more important groups of mountains are discussed under separate headings, as **ALPS**, **HIMALAYA**, **ANDES**, etc.

MOUNT CARMEL, a borough of Northumberland county, Pa., and a noted center of anthracite coal production. The town has good railroad and telegraph facilities, banks, stores and some manufactures, and a population of 8254.

MOUNT HOLLY, capital of Burlington county, N. J., is a thriving manufacturing city, nineteen miles from Philadelphia. It has good railroad, telegraph, and banking facilities, and a population (1890) of 5,500.

MOUNT STERLING, the capital of Montgomery county, Ky., with a population of 5,500, has considerable manufactures of carriages, furniture, etc., and some shipping trade.

MOUNT VERNON, a village of Westchester county, N. Y., with a population of 10,677, is situated on the Bronx river, at the intersection of several railroads. It has some manufactories, and is well supplied with churches and schools.

MOUNT VERNON, the capital of Knox county, Ohio, is a busy manufacturing place of 6,016 inhabitants. There is considerable water-power, which is utilized for flouring mills and factories.

MOUNT VERNON, the capital of Posey county, Ind., is situated on the Ohio river, thirty-three miles from Evansville, and has railroad facilities, banks, factories, and about 5,600 people.

MOUNT VERNON, in Fairfax county, Va., on the right bank of the Potomac, fifteen miles from Washington, D. C., is famous as the home and the burial place of George Washington.

MOURZUK, or **MURZUK**. See **FEZZAN**.

MOUSE. The bright and active, though mischievous, little animal known to us by the name of Mouse and its close relative the common rat are the most familiar and also the most typical members of the *Murinae*, a sub-family containing about 250 species assignable to no less than eighteen distinct genera, all of which, however, are so superficially alike that one or other of the English names rat or mouse would be fairly appropriate to any of them. Together they form one, and that by far the largest and most important, of the ten sub-families into which the Muridæ or rat family (order *Rodentia*) are divisible. Their nearest neighbors are the Tree-mice (*Dendromyinae*) and the Hamsters (*Cricetinae*), from which they differ by various cranial and dental characters. Among themselves they have for the most part very strong resemblances; nearly all are of very rat-like exterior, of light and active build, with large ears, bright and well-developed eyes, long and scaly tails, and nearly always of dull and inconspicuous coloration, as is suitable to their usually burrowing and nocturnal habits.

MOUSE-BIRD, the name by which in Cape Colony and Natal the members of the genus *Colius* of Brisson are known—partly, it would seem, from their general coloration, but more probably from their singular habit of creeping along the boughs of trees with the whole tarsus applied to the branch. By the earlier systematists, who had few opportunities of examining the internal structure of exotic forms, *Colius* was placed among the *Fringillidæ*; but nearly all travelers who had seen one or another species of it in life demurred to that view. The *Coliidae* are small birds, with a rather finch-like bill, a more or less crested head, a very long tail, and generally of a dun or slate-colored plumage that sometimes brightens into blue or is pleasingly diversified with white or chestnut. They feed almost wholly on fruits, but occasionally take insects, in quest of which they pass in bands of fifteen or twenty from tree to tree, and hang in all attitudes from the branches as they feed. It is even said that they sleep suspended by their powerful and versatile toes. Seven species are believed to exist, all belonging to the Ethiopian Region (of which the Family is one of the most characteristic), and ranging from Abyssinia southward. Three species inhabit Cape Colony.

MOVERS, FRANZ KARL, a German Orientalist, was born at Koesfeld, July 17, 1806, studied at Münster, was consecrated priest in 1829, and was professor in the Catholic theological faculty at Breslau from 1839 to his death on September 28, 1856.

MOZAMBIQUE, a colonial province of Portugal, extending for about 1,200 miles along the east coast of Africa, from Cape Delgado to Lorenzo Marques, on the south side of Delagoa Bay. On paper it forms an imposing territory of at least 38,000 square miles, without any definite limit toward the interior; but, in reality, it consists of a few settlements and military posts, feebly authoritative over the surrounding tribes. The Portuguese divide the province into the military districts of Mozambique, Cape Delgado, Angoche, Quilimane, Tete, Sofala, and Lorenzo Marques, with the presidential territory of Bazaruto. The small coral island of Mozambique, which gives its name to the province and contains the provincial capital, lies about three miles off the coast of the peninsula Mossuril. It is defended by three forts, of which the principal, St. Sebastian, is built entirely of stone brought from Portugal in 1510. The streets of the town (properly St. Sebastian of Mozambique) are narrow and crooked, and the stone-built, flat-roofed houses are for the most part dull and lifeless in spite of their being washed with pink, brown, and white. Its principal buildings are the palace of the governor-general, formerly a Jesuit college, the custom-house, the hospital, and three churches. The population includes, besides Portuguese and Africans, Banyans, Parsees, and Arabs. The district of Cape Delgado includes the archipelago of the Querimba Islands, and, on the opposite mainland, Mucimba, Pangane, Lumbo, Quisanga, Montepes, Arimba, besides the colony of Europeans founded in 1857 on the Bay of Pemba. The chief town is Ibo, with over 2,000 inhabitants, situated on the island of the same name. Of the twenty-eight islands some are nearly deserted, although both their climate and that of the opposite coast is good. Ibo has a considerable trade, the exports being sesame, calumba root, oil-seeds, ivory, and wax. Turtle fishing is carried on; but little has been done to develop the agricultural capabilities of the district. The district of Angoche extends nominally as far south as the Querimbo river, and includes the Angoche and Primeria islands, and a small settlement on the Angoche river. The trade is very limited. The district of Quilimane is the center of the commerce of the Zambesi, and the town ranks next to

Mozambique as a port. Near the village of St. Marçal de Sena, the headquarters of the sub-military government of Sena, there are said to be very rich gold mines. Tete, to the northwest of Sena, is situated in the center of an immense coal-basin. It includes a number of settlements on the Zambesi, reaching as far as Zumbo, where a great native fair is held. The chief town is St. Thiajo Major, about 250 miles from the mouth of the Zambesi. The climate is genial, and the soil is specially suitable for wheat, maize, tobacco, cotton, and sugar-cane. The chief town of the Sofala district is Sofala, on the island of Chiloane, in the estuary of the Sofala river. It was the original capital of the colony, and still possesses a good harbor, which, however, is not always easily accessible, and requires good piloting. The district is rich in gold mines, and is supposed by some to be the Ophir with which King Solomon traded. Inhambane, opposite Gasa, is very much encroached upon by the Zulu tribes. The natural products are similar to those in the Zambesi valley. A species of oil-plant is very abundant, as well as amber and sarsaparilla. The district of Lorenzo Marques is almost wholly confined to the town of that name (*q.v.*). The Archipelago of Bazaruto comprises the islands of Bazaruto, Benguerua, Xegine, Bango and Santa Carolina. The soil and climate are both excellent, and there are important pearl fisheries.

MOZARAB, Spanish *Mozárabe* is a corruption of the Arabic *Musta'rib*, coll. *Musta'riba*, which denotes persons not Arab by race who have assimilated themselves to the Arabs. This name was applied by the Moslems in Spain to the Christian communities existing among them, in Cordova, Seville, Toledo, and other large cities, in the exercise of their own laws and religion. The ancient liturgy used by the Christians of Toledo, the first great body of this kind who were freed from the Moslem yoke, is commonly known as Mozarabic.

MOZART, WOLFGANG AMADEUS, one of the greatest musicians the world has ever produced, was born at Salzburg, January 27, 1756.

On April 10, 1764, Leopold Mozart brought his family to England, engaging a lodging in Cecil Court, St. Martin's Lane, whence he afterward removed to Frith Street, Soho. On April 27th and May 19th Wolfgang played before the royal family with immense success, accompanying the queen in a song and playing at sight anything that the king set before him. The little artist gave a public concert at the Great Room in Spring Gardens on June 5th, and on the 29th played a concerto at Ranelagh. He now made his first attempt at the composition of a symphony; published a third set of sonatas, dedicated to the queen; and wrote an anthem for four voices entitled *God is our Refuge*, for presentation to the British Museum. In July, 1764, he played at Tunbridge Wells. Toward the close of 1766 we find him at home in Salzburg, diligently studying Fux's *Gradus ad Parnassum*. In September, 1767, he paid a second visit to Vienna, and at the suggestion of the emperor Joseph II. composed an opera buffa, *La Finta Semplice*.

In October, 1770, Wolfgang and his father returned to Milan for the completion and production of the new opera. The libretto, entitled *Mitridate, Re di Ponto*, was furnished by an obscure poet from Turin, to the great disappointment of the young maestro, who had hoped to set a drama by Metastasio. The progress of the work was interrupted from time to time by the miserable intrigues which seem inseparable from the lyric stage, exacerbated in this particular case by the jealousy of the resident professors, who refused to believe either that an Italian opera could be written by

native of Germany, or that a boy of fourteen could manage the orchestra of La Scala, at that time the largest in Europe. Fortunately the detractors were effectively silenced at the first full rehearsal; and on December 26th, Wolfgang took his seat at the harpsichord and directed his work amidst a storm of genuine applause. The success of the piece was unprecedented. It had a continuous run of twenty nights, and delighted even the most captious critics.

Wolfgang's triumph was now complete. After playing with his usual success in Turin, Verona, Venice, Padua, and other Italian cities, he returned with his father to Salzburg in March, 1771, commissioned to compose a grand dramatic serenata for the approaching marriage of the archduke Ferdinand, and an opera for La Scala, to be performed during the season of 1773. The wedding took place at Milan on October 21st; and the serenata, *Ascanio in Alba*, was produced with an effect which completely eclipsed Hasse's new opera, *Ruggiero*, composed for the same festivity. The empress Maria Theresa was so delighted with it that in addition to his fee she presented Wolfgang with a watch set with diamonds and enameled with her portrait; and Hasse, forgetful of his own defeat, generously uttered the often-quoted prophecy, "This boy will cause us all to be forgotten."

During the absence of Wolfgang and his father the good archbishop of Salzburg died; and in the spring of the year 1772 Hieronymus, count of Colloredo, was elected in his stead, to the horror of all who were acquainted with his real character. The Mozart family did their best to propitiate their new lord, for whose installation Wolfgang, after his return from Milan, composed an opera, *Il Sogno di Scipione*; but the newly-elected prelate had no taste for art, and was utterly incapable of appreciating the charm of any intellectual pursuit whatever. For the present, however, things went on smoothly. In October the father and son once more visited Milan for the preparation and production of the new opera, *Lucio Silla*, which was produced at Christmas with a success quite equal to that of *Mitridate*, and ran between twenty and thirty nights. Unfortunately, however, these artistic triumphs were far from profitable in their pecuniary aspect. The family grew poorer and poorer; and the archbishop Hieronymus was not the man to rescue them from penury.

In the meantime Wolfgang continued to produce new works with incredible rapidity. In 1775 he composed an opera for Munich, *La Finta Giardiniera*, produced on January 13th. In the following March he set to music Metastasio's dramatic cantata, *Il Re Pastore*. Concertos, masses, symphonies, sonatas, and other important works, both vocal and instrumental, followed each other without a pause. And this fertility of invention, instead of exhausting his genius, seemed only to stimulate it to still more indefatigable exertions.

He was engaged to compose an opera for Munich for the carnival of 1781. The libretto was furnished by the abbate Varesco, court chaplain at Salzburg, a truly sympathetic collaborateur. On January 29, 1781, the work was produced under the title of *Idomeneo, Re di Creta* with triumphant success. By the emperor's command he wrote a German opera, *Die Entführung aus dem Serail*, which on July 16, 1782, was received with acclamation, and not long afterward was performed with equal success at Prague. This great work raised the national "singspiel" to a level commensurate with that which *Idomeneo* had already attained for the Italian "opera seria."

The next great event in Mozart's life was a disastrous one. Though Aloysia Weber had long since rejected him, his renewed intimacy with the family led to a most

unfortunate marriage with her younger sister, Constance, a woman who, neither his equal in intellect nor his superior in prudence, added little to the happiness of his life and less than nothing to its prosperity. The wedding took place at St. Stephen's on August 16, 1782. By the end of the year the thriftless pair were deeply in debt. Mozart composed incessantly, played at numberless concerts, and was in greater favor than ever at court and with the nobility; but to the last day of his life his purse was empty. He had, however, many kind friends, not the least affectionate of whom was the veteran Haydn, who was sincerely attached to him. With Gluck he was on terms of courteous intercourse only. Salieri detested him, and made no secret of his dislike.

Mozart's next dramatic venture was a German singspiel in one act, *Der Schauspieldirektor*, produced at Schönbrunn, February 7, 1786. Not quite three months later, on May 1st, he produced his marvellous *Le Nozze di Figaro*, the libretto for which was adapted from Beaumarchais by the abbé Da Ponte. The reception of this magnificent work was enthusiastic. But Vienna was a hotbed of intrigue. Everything that could be done by jealous plotters to mar the composer's success was done, and that so effectively that Mozart declared he would never bring out another opera in the city which treated him so meanly. Fortunately, *Figaro*, like *Die Entführung*, was repeated with brilliant success at Prague. Mozart went there to hear it, and received a commission to write an opera for the next season, with a fee of 100 ducats. Da Ponte furnished a libretto founded on Tirso de Molina's tale, *El Convidado de Piedra*, and entitled *Il Don Giovanni*. By October 28, 1787, the whole was ready with the exception of the overture, not a note of which was written on the evening before the performance. This circumstance has led to the idea that it was composed in haste, but it is certain that Mozart knew it all by heart and transcribed it during the night from memory, while his wife told fairy tales to keep him awake. The opera was produced on October 29th with extraordinary effect, and the overture, though played without rehearsal, was as successful as the rest of the music. Yet, when reproduced in Vienna, *Don Giovanni* pleased less than Salieri's comparatively worthless *Tarare*.

On returning to Vienna Mozart was appointed kammer-compositor to the emperor with a salary of 800 gulden (\$400). He also conducted Baron van Swieten's concerts, and composed great quantities both of sacred and secular music, but continued miserably poor, while his wife had become a confirmed invalid. In April, 1789, he accompanied Prince Lichnowski to Berlin, where King Frederick William II. offered him the post of "kapellmeister" with a salary of 3,000 thalers (\$2,250). Though most unwilling to quit the emperor's service, he informed him of the offer and requested leave to resign his appointment in Vienna. "Are you going to desert me, then?" asked the emperor; and Mozart, wounded by the reproach, remained to starve. The emperor now commissioned Mozart to compose another Italian opera, which was produced January 26, 1790, under the title *Così fan tutte*. Though the libretto by Da Ponte was too stupid for criticism, the music was delicious, and the opera would probably have had a long run but for the emperor's death on February 7th. The new emperor, Leopold II., was elected at Frankfort in September, and Mozart went thither in the hope of giving some concerts, but he was obliged to sell his plate to pay the expenses of the journey, and returned in December. In March, 1791, Mozart consented to write a German opera upon an entirely new plan for Schikaneder, the

manager of the little theater in the Wieden suburb. The piece was addressed especially to the Freemasons and contained ceaseless allusions both in the words and music to the secrets of the brotherhood. Deeply interested in the affairs of a body of which he was himself a member, Mozart excelled himself in this new work, for the overture of which he invented a new art-form, that of the "symphonic fugue." He was rewarded for his labors by a brilliant artistic success, but Schikaneder alone reaped the financial benefit of the speculation.

Before the completion of *Die Zauberflöte* a stranger called on Mozart, requesting him to compose a *Requiem* and offering to pay for it in advance. He began the work under the influence of superstitious fear, believing that the messenger had been sent from the other world to forewarn him of his own approaching death. Meanwhile he received a commission to compose an opera, *La Clemenza di Tito*, for the coronation of the emperor at Prague. He worked incessantly, and far beyond his strength. The coronation took place on September 6th, and its splendors threw the opera very much into the shade. *Die Zauberflöte* was produced on September 30th and had a splendid run. But the *Requiem* still remained unfinished; the stranger therefore made another appointment, paying a further sum in advance. Mozart worked at it unremittingly, hoping to make it his greatest work. His sacred music, though less florid than Haydn's, was even more voluptuously beautiful, perfect in its kind, though showing no trace of the stern grandeur of Handel, or the devotional purity of Palestrina. In the *Requiem* he surpassed himself, but he was not permitted to finish it. When the stranger called the third time the composer was no more. The score of the *Requiem* was completed by Süßmayer, whose task, simplified by the instructions he had received from Mozart on his death-bed, was a purely mechanical one. It is now known that the work was commissioned by Count Walsegg, who wished to perform it as his own.

Mozart died December 5, 1791, apparently from fever, though he believed himself poisoned. His funeral was a disgrace to the court, the emperor, the public, society itself. On the afternoon of the 6th his body was hurried to a pauper's grave; and because it rained Van Swieten, Süßmayer, and three other "friends" turned back and left him to be carried to his last long home alone.

MOZDOK, a Russian town in the government of the Caucasus and province of Stavropol, lies on the left bank of the Terek, fifty-eight miles north of Vladikavkas, with which it is connected by a highroad, and thirty-six and one-half miles east of the Prochladnaya station on the Kostoff-Vladikavkas railway. The population (8,760 in 1863) numbered 11,008 in 1877. Gardening and agriculture are the main means of subsistence, scarcely fifty individuals living by trade. The melons and water melons of Mozdok are widely famed; and though vine-growing was only begun in 1873, by 1876 there was a production of 563 casks of wine or 1,416,000 bottles.

MOZLEY, JAMES BOWLING, English theologian, was born in Lincolnshire in 1813. He died at Shoreham on January 4, 1878.

MTSENSK, (popularly called *Amchensk*), a district town of Russia, situated in the government of Orel on the navigable Zushá river, seventeen miles from its junction with the Oka, on the Moscow and Kursk railway, thirty-two miles to the northeast of Orel.

MUCILAGE, a term which denotes a viscid or glutinous mixture of water and any gummy vegetable substance. The principal sources of mucilaginous matters are enumerated under GUM. A mucilage indicates a

physical condition or property rather than any definite chemical constitution, and consequently it may possess various characters, but as a rule the term is restricted to the bodies which swell into a kind of jelly with water, having the insoluble gum bassorin as their principal constituent. Such mucilages are useful in medicine as emollients and demulcents, and in the arts as thickeners, (in calico-printing, dyeing, etc.)

MUGGLETON, LODOWICK, the founder of the sect of the Muggletonians, was born in Bishopsgate street, London, about the year 1610. His father was a farrier, but he himself was bred to be a tailor. In 1651 he began to have revelations by "a motional voice," and to proclaim himself and a brother tailor, John Reeve, as the two witnesses mentioned in the Apocalypse, and as the "true prophets of the only high, immortal, glorious God, Jesus Christ." An exposition of their doctrines was published in 1656 under the title of *The Divine Looking-Glass*. Among other views (besides the doctrine of the divine mission of the authors) this work taught that the distinction of the three persons in the Trinity is merely nominal, that God has a real human body, and that He left Elijah as His vicegerent in heaven when He Himself descended to die on the cross. These opinions, strange to say, gained considerable currency, and naturally also called forth much opposition. William Penn's book, *The New Witnesses proved Old Heretics* (1672), was directed against them, and in 1676 Muggleton was tried at the Old Bailey and convicted of blasphemy. Reeve died in 1658, but Muggleton survived till 1698. Even as late as 1846 *The Divine Looking-Glass* was reprinted by members of the sect, which is now, however, believed to be extinct.

MUGWUMP is a term of doubtful origin and most probably a euphonic invention and used as a designation for citizens who allege their country to be superior to their party and refuse to be bound by party nominations. It was first applied in 1884 to the republicans who refused to support James G. Blaine and who advocated the election of Grover Cleveland with a view to secure reform in the civil service. Invented as a term of political description, it now means one who is dissatisfied politically.

MÜHLHAUSEN, a busy manufacturing town of Thuringia in the district of Erfurt, Prussia, is situated on the right bank of the Unstrut, twenty-five miles to the northwest of Gotha. The great majority of the inhabitants, numbering 23,478 in 1880, are Protestants.

Mühlhausen is one of the oldest towns in Thuringia, and is said to have been fortified in 925.

MUIR, JOHN, Sanskrit scholar, was born February 5, 1810, in Glasgow. He died March 7, 1882.

MULA, a town of Spain, in the province of Murcia, is situated twenty-two miles to the westward of that town on the slope and summit of an eminence on the left bank of the Mula, a small tributary of the Segura, periodically liable to destructive floods. The industries and trade of the place are connected principally with agriculture. The population in 1877 was 10,597.

MULBERRY. The mulberry family (*Moraceæ*) is usually included, along with the closely-allied figs, bread-fruits, nettles, hops, planes, and elms, in one vast alliance of monochlamydeous Exogens, the order *Urticaceæ*. The *Moraceæ* include three sub-families, of which the typical genera are: *Dorstenia*, which is almost a Fig; *Broussonetia*, the Paper Mulberry of Japan, the East Indies, and the South Sea Islands; and *Morus*, the Mulberry proper, of which the ten or twelve species are all native to temperate regions in Asia and America, or to hill regions in their tropics, but are readily cultivated in similar climates in Europe, Africa, and Australia.

The Black Mulberry (*Morus nigra*, L.) is mainly cultivated for its purplish black compound fruit (a *sorosis* formed by the aggregated drupes of the whole female inflorescence), which is wholesome and palatable if eaten fresh from the tree before acetous fermentation has had time to set in. Save in syrup, and on account of its rich dark-red coloring matter, it has no longer any pharmaceutical uses.

The White Mulberry (*M. alba*, L.), so called from its nearly white fruit, is the one mainly employed in sericulture. There are many varieties, among which the Philippine Mulberry (var. *multicaulis*) is perhaps most highly esteemed. The American and Indian species (*M. americana* and *M. indica*, the latter not to be confounded with *Morinda citrifolia*, a cinchonaceous tree, sometimes also called Indian Mulberry) are also cultivated for the same purpose.

MULE. Though this term is not infrequently applied to the produce of two creatures of different species, and is synonymous with hybrid, yet in its ordinary acceptance it is employed to designate the offspring or "cross" between the equine and asinine species. There are two kinds of mules—the *Mule* proper, which is the hybrid produce of a male ass with a mare, and the *Hinny*, the offspring of a stallion and female ass. The mule is the more valuable of the two, and to its production the attention of breeders is entirely directed. Indeed, the hinny is so rarely produced, owing to the antipathy of the stallion to the female ass, that many authorities deny its existence.

Intercourse between the mare and male ass is very seldom voluntary; indeed, horses will not associate with asses, and combats between them are often serious. The male ass will freely mate with the mare, but the latter has a strong repugnance to him, as has also the stallion for the female ass. Hence in mule-breeding the mare has to be blindfolded and otherwise deceived, or secured in a travis or by ropes, before she will allow the ass to approach her. Fecundation is not so certain between the ass and horse species as between the male and female of either species, for, while of four mares three at least will be fecundated by the stallion, as a rule only two will be so by the ass.

Fecundation of the hybrid female by the male ass or the stallion is not very rare; but it is otherwise with the male hybrid, no instance being recorded in which he has been prolific, though physically the animal appears to be perfect, and often exhibits an intense ardor for the female. The female mule, when fecundated, seldom reaches the natural term of pregnancy, and rarely brings forth a living offspring. The duration of gestation in a mare impregnated by the ass is a little longer than in impregnation by the stallion—the average being 375 days. Abortion readily occurs, and more care is necessary than in breeding horses or asses.

The mule foal is not so strong on its limbs as the horse foal, and it does not grow so quickly. It is longer in reaching maturity, for it is of little use under four years of age; but it is useful for a longer period than the horse, often working until it is twenty, thirty, and even forty years of age. When full grown the mule is from thirteen to fifteen, and sometimes sixteen hands high; but those from fourteen to fifteen hands are generally preferred.

The mule, like the ass, enjoys an extraordinary immunity from disease. After the campaign in Egypt in 1882 the English horses suffered most extensively and severely from a kind of malarious fever, but the mules were entirely exempt. A similar exemption has been noticed during the prevalence of epizootic maladies at other times. Nevertheless those diseases which attack the mule (and the asinine species) run their course with

great rapidity; for example, glanders, which often appears in a chronic form in the horse, is most acute in the mule and ass. These are also very liable to tetanus from trifling injuries.

Good mules are reared in North and South America, the principal districts for breeding them in the United States being Kentucky, Missouri, and Kansas. The Kentucky mules are well shaped and showy, being derived from nearly thoroughbred mares known as Kentucky trotters, while those reared in Missouri are hardy, and can endure much privation and hardship. The Mexican mule, bred by a male ass out of a mustang mare, is also a very hardy, strong, and useful animal.

MÜLHAUSEN (in French *Mulhouse*), the chief town of a circle and the industrial center of Upper Alsace, Germany, lies between the Ill, an affluent of the Rhine, and the Rhine-Rhone Canal, about fifty-six miles to the south of Strasburg and eighteen to the northwest of Basel. The population was in 1880, 63,629, of whom 47,395 were Roman Catholic.

MÜLHEIM-AM-RHEIN, the chief town of a circle in the district of Cologne, Prussia, lies on the right bank of the Rhine, two miles below Cologne. The population in 1880 was 20,420.

MÜLHEIM-AN-DER-RUHR, the chief town of a circle in the district of Düsseldorf, Prussia, is situated on the Ruhr, an affluent of the Rhine, about seven miles from Essen, and at the intersection of several railways. Like most of the towns in this district, Mülheim finds its chief industry in iron-working, and contains numerous blast furnaces, rolling mills, foundries, and engine works. In 1880 it contained 22,146 inhabitants, about two-thirds of whom were Protestants.

MULL, an island of Scotland, county of Argyll, and the largest of the Inner Hebrides, is bounded west by the Atlantic, north by Loch Sunart, northeast by the Sound of Mull, and southeast by the Firth of Lorn. Its area comprises about 235,000 acres, of which only about 13,000 are arable. The population of the island in 1881 was only 5,229.

MÜLLER, JOHANN. See REGIOMONTANUS.

MÜLLER, JOHANN VON, an eminent Swiss historian, was born on January 3, 1752, at Schaffhausen, where his father was a clergyman and rector of the gymnasium. On May 29, 1809, he died at Cassel.

MÜLLER, JOHANNES, one of the most distinguished physiologists of Germany, was born at Coblenz on July 14, 1801. He became a privat-docent in the university of Bonn in 1824. In 1826 he was appointed extraordinary professor of physiology in the same university, and he became the ordinary professor in 1830. In 1833 he was removed to the university of Berlin, where he filled the chair of anatomy and physiology with great distinction until his death on April 28, 1858.

MÜLLER, KARL OTFRIED, an eminent writer on ancient Greece, was born at Brieg in Silesia, in 1797, and died in 1840.

MÜLLER, WILLIAM JAMES, English landscape and figure painter, was born at Bristol on June 28, 1812, and died there in 1845.

MULLET. This name is applied to two very different kinds of fishes, which are distinguished as Red Mulletts and Gray Mulletts. Red Mulletts (genus *Mullus*, the name given by the ancient Romans) are marine fishes. About forty different species of Red Mulletts are known, chiefly from the tropical and sub-tropical parts of the Indo-Pacific Ocean. In the Atlantic the species are much less numerous, the most celebrated being the European *Mullus barbatus*, which is abundant in the Mediterranean, and tolerably common on the coasts of England and Ireland.

MULLINGAR, a market-town of Ireland, capital of

Westmeath, is situated near the Brosna and on the Royal canal, forty-four miles west-by-north of Dublin.

MULREADY, WILLIAM, subject painter, was born at Ennis, County Clare, April 30, 1786. He died in 1863.

MÚLTÁN, or MOOLTAN, a district in the lieutenant-governorship of the Punjab, has an area of 5,880 square miles. Along the banks of the Chenáb, Sutlej, and Rávi extend fringes of cultivation varying in width from three to twenty miles, but the interior uplands have the same barren character as the district of MONTGOMERY, (*q.v.*) The census of 1881 returned the population at 551,964 persons.

MÚLTÁN, or MOOLTAN, city and headquarters of the above district, is situated four miles from the present left bank of the Chenáb. The total population in 1881 was 68,674. As a trade center Múltán possesses great importance, its chief imports being cotton and other piece-goods, while the main staples of export are sugar, cotton, indigo, and wool.

MULTIPLEPOINDING is the technical term for a form of action in Scotch law by which conflicting claims to the same fund or property are determined.

MUMMY. The origin of mummification in Egypt has given rise to much learned conjecture (see EMBALMING), now, however, superseded by positive knowledge—a comparative study of sepulchral texts having furnished Egyptologists with convincing proof that the inviolate preservation of the body was deemed essential to the corporeal resurrection of the “justified” dead. The living man consists of a body, a soul, an intelligence, and an appearance or *eidolon*—in Egyptian, a *ka*. Death dissociated these four parts, which must ultimately be reunited for all eternity. Between death on earth and life everlasting there intervened, however, a period varying from 3,000 to 10,000 years, during which the intelligence wandered, luminous, through space, while the soul performed a painful probationary pilgrimage through the mysterious under-world. The body, in order that it should await, intact, the return of the soul whose habitation it was, must meanwhile be guarded from corruption and every danger. Hence, and hence only, the extraordinary measures taken to insure the preservation of the corpse and the inviolability of the sepulcher; hence the huge pyramid, the secret pit, and the subterranean labyrinth. The shadowy and impalpable *ka*—the mere aspect, be it remembered, of the man—was supposed to dwell in the tomb with the mummied body. This fragile conception was not, however, indestructible, like the soul and the intelligence. Being an aspect, it must perforce be the aspect of something material; and, if the body which it represents were destroyed or damaged, the *ka* was liable to the like mischance. In view of this danger, the Egyptian, by stocking his sepulcher with portrait statues, sought to provide the *ka* with other chances of continuance, these statues being designed, in a strictly literal sense, to serve as *supports* or dummies for the *ka*. The funeral portrait statues of the ancient empire (Dynasties I. to VI.) are marvels of realistic art in basalt, diorite, limestone, and wood. As many as twenty duplicates have been found in a single tomb, and always secreted in hidden chambers constructed in the thickness of the walls of the sepulcher. The Bulak Museum is very rich in *ka* statues of the ancient empire; and the British Museum contains two in wood from the tomb of Seti I., of the period of Dynasty XIX.

For the processes of mummification, as narrated by Greek and Latin authors, see EMBALMING. The details which follow are taken from original Egyptian sources.

The embalmment of a man of wealth, done in the costliest manner, consisted of—(1) the “going into the good

abode,” (2) the *Teb*, (3) the *Kesau*. The first of these was the process of evisceration, cleansing, etc., which occupied fifteen or sixteen days; the second was the salting or bituminizing, and took nineteen or twenty days; the third was the spicing and bandaging, and took thirty-four or thirty-five days—making seventy or seventy-two days in all. There were four special “rituals” for the guidance of the priestly operators and assistants—(1) that of “going into the good abode,” which was a kind of surgical manual for the use of the paraschists, enumerating the incisions to be made in the body; (2) that of “the *Kesau*,” a corresponding manual for the use of the taricheutes, containing lists of the necessary gums, resins, spices, etc., directions as to the number and nature of the bandages, and prayers to be repeated while adjusting them; (3) the “water-ritual” or service-book of litanies, to be recited during the transport of the mummy to the cemetery, which was almost always done by boat; (4) the funereal ritual, performed on consigning the mummy to the tomb. No copy of the first of these documents is known, but its substance is summarized in the Rhind papyrus. Of the other three, contemporary copies written on papyrus exist in various museums. Establishments for the reception and mummification of the dead were attached to all the great cemeteries. These mortuary suburbs, by the Greeks called “*memnonia*,” were inhabited by a large population of embalmers, mummy-case makers, gilders, painters, scribes, priests, and the like; and it has been calculated that from 500 to 800 corpses must always have been on hand in the workshops attached to the necropolis of Memphis. To prevent mistakes in delivering the mummies to their families, the bandagers were in the habit of marking the wrappings with the name and age of the deceased, sometimes adding the name and regnal year of the king in whose time he died. The ink in which these entries were written was made from nitrate of silver, like the marking-ink of the present day. The bandages were of linen only. The texture varied with the rank of the mummy, some being as fine as the finest India muslin, and some extremely coarse. The quantity used was enormous, and persons used to save their old linen for this purpose all their lives long. Each limb, finger, and toe was first separately swathed; and finally the whole body was enveloped in numberless convolutions, the contours of the shrunken form being skillfully restored by means of padding. From 700 to 1,250 yards of bandages, in strips of three to four inches wide, have been found on mummies.

The processes of mummification varied in different parts of Egypt and at different periods. The mummies made at Memphis are black, dry, and brittle, whereas those of the best Theban epoch are yellowish, flexible, and so elastic that the flesh yields to the touch of the finger and the limbs may be bent without breaking. Champollion-Figeac attributes this exquisite softness and elasticity to the injection of costly chemical liquids into the veins, whereby the substance of the flesh was preserved. The natron process, on the contrary, destroyed the flesh, leaving only the skin and the bones. By some schools of embalmers the cavity of the skull, after the withdrawal of the brain, was washed out by an injection of refined bitumen, the effect of which was to preserve the membranous covering which has frequently been found inside the brain-pan, dried and unimpaired. Hair is constantly found on the heads of mummies, sometimes plaited, sometimes frizzled—thus showing that the fashion of wearing wigs was by no means universal. The under bandages of mummies were laid on wet, having probably been dipped in spirits. They sometimes come off with the solidity of a pasteboard mask; and lifelike portraits of the dead

have been reproduced by simply casting plaster into these masks as into a mold. When Syrian turpentine came into use the Theban mummies ceased to maintain their supremacy, and became even blacker than those of Memphis, the corpse and its bandages forming one solid mass almost as hard as stone. In Memphite mummies, especially of the Ramesside and Saitic periods, the cavity of the chest is found filled with scarabæi and amulets in *pietra dura*. The Theban mummies, on the other hand, from Dynasty XI. to Dynasty XXIII., were adorned with rings, pectoral ornaments, collars, bracelets, etc., in exquisitely-wrought gold inlaid with lapis-lazuli, carnelian, green feldspar, and other precious stones. Under the Greeks and Romans the art of mummification declined. Rudely-painted wooden coffins were substituted for the granite sarcophagi and richly-decorated mummy-cases of former times. The mummies became ashen-gray, or, being boiled in bitumen, were black, heavy, and shapeless. Those of Græco-Roman times are frequently found wrapped in painted shrouds, and sometimes with coarsely-daubed encaustic portraits on panel laid above the faces. Doctor Birch gives 700 A.D. as the date at which mummification practically ceased. It was formerly supposed that the bodies of the dead were merely desiccated under the ancient empire, and that actual embalming was not practiced before 2000 B.C. Recent explorations among the ruined pyramids of Sakkarah have, however, brought to light the mummied corpse of King Merenra, and part of the mummy of King Pepi, his father, both of Dynasty VI. Though denuded of its wrappings by ancient tomb-breakers, the mummy of Merenra is distinctly impressed in the usual manner with marks of its former bandages; and portions of the bandages and a "well-embalmed" hand were recovered from the *débris* of that of King Pepi. It is thus shown that mummification was an established rite toward the close of the ancient empire, and that the processes then in use were identical with those of later times, which compels us to ascribe a very early date (possibly 3800 or 4000 B.C.) to the beginnings of the art.

MUMPS (syn.) *Cynanche parotidæa*, *parotitis*, also "The Branks," a contagious disease characterized by inflammatory swelling of the parotid and other salivary glands, frequently occurring as an epidemic, and affecting young persons. The disease generally sets in with symptoms of a cold or catarrh accompanied with slight febrile disturbance, but soon the nature of the ailment is announced by the occurrence of swelling and stiffening in the region of the parotid gland in front of the ear. The swelling speedily increases in size and spreads downward toward the neck and under the jaw, involving the numerous glands in that locality. The effect is to produce much disfigurement, which becomes still greater should the inflammation spread, as often happens, to the glands on the other side of the face and neck. Pain is present in the swollen parts, but it is seldom very severe, nor is there much redness or any tendency to suppuration. There is, however, considerable interference with the acts of mastication and swallowing. After continuing for four or five days the swelling and other symptoms abate, and the parts are soon restored to their normal condition. During the period of convalescence there occasionally occur some swelling and tenderness in other glands, such as the testicles in males, and the mammæ or ovaries in females, but these are of short duration and of no serious significance. That this complaint is highly contagious is shown by the readiness with which it spreads among children in schools, etc. The nature of the infecting agent is unknown, but the medium of communication is most probably the breath or secretions of the mouth.

Mumps is in general a mild disease, and requires but little treatment beyond a gentle laxative, the application of warm fomentations to the swollen and painful parts, and the use of soft food.

MUNCHAUSEN, BARON, the modern Philopseudes, "of whom Ferdinand Mendez Pinto was but a type," is commonly identified with Hieronymus Karl Friedrich von Münchhausen, of Bodenswerder, in Hanover, who, having entered the Russian service and served in several campaigns against the Turks, amused himself in his retirement by relating extraordinary instances of his prowess as soldier and sportsman. He died in 1797. In 1785 a little book of forty-eight pages, *Baron Munchausen's Narrative of his Marvelous Travels and Campaigns in Russia*, was published in London. A second edition was printed at Oxford next year; an enlarged London edition speedily followed, and the book had gone through five editions before, in 1787, it was introduced to the German public in translation, with a preface by the poet Bürger.

MUNCIE, a city of the United States, county seat of Delaware county, Ind., fifty-four miles northeast of Indianapolis. It is a flourishing pleasant-looking place, with city hall, courthouse, public library, good railroad facilities, two national banks, some minor manufactures, and a population (1890) of 11,345.

MUNDAY, ANTHONY, was one of the most versatile miscellaneous writers of the Shakespearean age. In the introduction to his comedy, *John a Green and John a Cumber*, reprinted for the Shakespeare Society, Collier enumerates forty-seven works of which Munday was whole or part author, the subjects being very various—pastoral poems, journalistic tracts and pamphlets, translations of romances, plays, pageants. He was born in 1553, and died August 10, 1633.

MUNGO, ST. See **KENTIGERN**.

MUNGOOS, or MONGOOS. See **ICHNEUMON**.

MUNICH (in German, *München*), the capital of the kingdom of Bavaria and the fourth largest town in the German empire, is situated in an elevated and barren plain to the north of the Bavarian Alps. Owing to its lofty site (1,700 feet above the sea) and the proximity of the Alps the climate is rather changeable, and its mean annual temperature, 49° to 50° Fahr., is little higher than that of many places much farther to the north. The annual rainfall is stated at nearly thirty inches. The situation of Munich is devoid of physical advantages, and the surrounding district is no way remarkable for its wealth, but the construction of roads and railways has counterbalanced the lack of natural highways, while the central position of the town makes it easy of access from all parts of Europe.

Munich is divided into nineteen municipal districts, fourteen of which, including the old town, lie on the left bank of the small river Isar, while the suburban districts of Au, Haidhausen, Giesing, and Ramersdorf are on the opposite bank. The old town, still containing many narrow and irregular streets, forms a semicircle with its diameter toward the river, while round its periphery has sprung up the greater part of modern Munich, including the handsome Maximilian and Ludwig districts. The wall with which Munich was formerly surrounded has been pulled down, but some of the gates have been left standing. The most interesting of these is the Isar Thor, restored in 1835 and adorned with modern frescoes. The Sieges Thor or gate of victory is a modern imitation of the arch of Constantine at Rome, while the stately Propylæa is a reproduction of the gates of the Athenian Acropolis.

At the beginning of the present century Munich was in no way distinguishable from the crowd of second-rate German towns, but since the accession of Louis I.

in 1825 it has undergone a metamorphosis of the most remarkable character. This splendor-loving prince devoted himself heart and soul to the embellishment of his "residence," and his successors have followed in his footsteps with such zeal that Munich is now almost unrivaled for architectural magnificence among the smaller capitals of Europe, while its collections of art entitle it to rank alongside of Dresden and Berlin. Most of the modern buildings have been erected after celebrated prototypes of other countries and eras, so that, as has been said by Carrère, a walk through Munich affords a picture of the architecture and art of 2,000 years. The want of local coloring is perhaps a blemish in this "museum of architecture," and it has also been objected that the prevailing uniformity of surface in the buildings does not produce sufficient contrast of light and shade. In carrying out his plans Louis I. was ably seconded by the architect Klenze, while the external decorations of painting and sculpture were mainly designed by Cornelius, Kaulbach, and Schwanthaler.

The valuable collections of Munich, in virtue of which it ranks among the art-centers of Europe, are enshrined in handsome and appropriate buildings, most of them in the new Maximilian suburb on the north side of the town.

The scientific collections of Munich are on a par with its galleries of art.

At the head of the educational institutions of Munich stands the university, founded at Ingolstadt in 1472, removed to Landshut in 1800, and transferred thence to Munich in 1826. It has a staff of about 130 professors and lecturers, and in 1882 was attended by 2,183 students. In addition to the four usual faculties there is a fifth, of political economy. In connection with the university are medical and other schools, a priests' seminary, and a library of 200,000 volumes. The polytechnic institute, contained in a handsome brick edifice, adorned with medallions of celebrated architects, mathematicians, and naturalists, is also attended by a large number of students. Munich contains three gymnasia, a real-gymnasium, a military academy, a veterinary college, two industrial schools, a commercial school, a school for architects and builders, several normal schools, a conservatory of music, a dramatic training school, and about twenty-five elementary schools. Among the numerous benevolent institutions the most prominent are the asylums for the blind, the deaf and dumb, and the insane, and the general hospital. The general prison in the suburb of Au is considered a model of its kind; and a large military prison has just been erected. Among the other public buildings which call for mention are the crystal palace, 765 feet in length, erected for the great exhibition of 1854; the slaughter-houses, covering nine acres of ground; the Wittelsbach palace, in the Early English Pointed style; the post-office; the arsenal, containing a military museum; the new railway station, the art-industrial institution, the Maximilian barracks, the corn hall, and the aquarium. Among the numerous monuments with which the squares and streets are adorned, the most important are the colossal statue of Maximilian II. in the Maximilianstrasse, the equestrian statues of Louis I. and the elector Maximilian, and the obelisk erected to the 30,000 Bavarians who perished in Napoleon's expedition to Moscow.

Munich is well supplied with public parks. The population amounted at the census of September 28, 1889, to 281,000, an increase of 50,000 in ten years.

The commerce and manufactures of Munich are scarcely commensurate with its artistic importance, though it has lately begun to take rank among the great industrial centers.

MUNICIPALITY. A municipality is an organization for the self-government of a city or town by means of a corporation empowered generally to maintain peace and order, and to manage the affairs of the inhabitants. Such a corporation consists of a head as a mayor or provost, and of superior members as aldermen and councilors, together with the simple corporators who are represented by the governing body; it acts as a person by its common seal and has a perpetual succession with power to hold lands subject to the restrictions of the mortmain laws, and it can sue or be sued or be indicted, although there are of course many personal matters which do not come within the functions and liabilities of such bodies politic. Where necessary for its primary objects, every corporation has power to make by-laws and to enforce them by penalties, provided they are not unjust or unreasonable or otherwise inconsistent with the objects of the incorporation or charter or other instrument of foundation; and in the case of a municipality such by-laws will be binding even upon strangers within the district.

The municipalities of every country have a separate history of their own, and it is difficult to find any general law for determining their methods of development. According to their opportunities the oppressed wear out their conquerors' patience and too often become oppressors in their turn: as the state becomes more complex the old confederacies are broken up, and the scattered communities are reduced to order by a central government, and as privilege begins to disappear the towns are regulated by a common set of rules, or the whole country, as in France, is parceled out again into a new series of communes or corporate districts. In Spain, the needs of the state gave immediate freedom to its defenders. In Italy the cities grew too soon into a crowd of independent republics. The history of Lincoln and Exeter and the cities of the Danelagh shows that "the tendency of the great cities of England was toward a more than municipal independence." If these movements had not been checked by the Norman Conquest, English history might have been "like that of the imperial kingdoms." But, as this event turned out, there is little in the record of the German cities which bears upon that of English municipalities, excepting some slight resemblances between the powers acquired by the city of London and those of the Hanse towns and the mercantile principalities of Nuremberg and Augsburg. The free cities of Germany were at first divided between the emperors and their immediate vassals, the former ruling through the bishops as imperial vicars; in the twelfth century the citizens began to elect councils and to administer a concurrent jurisdiction; in the next century they either purchased full powers or drove out the vicars and bailiffs by force; the revolutions which followed the fall of the Hohenstauffen family enabled the cities to free themselves from the mediate lords and to hold directly of the empire, and they were soon afterward admitted to the diet on equal terms with the rest of its sovereign constituents.

The privileges of the cities in the United States illustrate the proposition that the history of every country must determine the type of its municipalities. In almost all parts of Europe the civic franchises arose out of some treaty or contract between the lord and his dependents; in France, however, the character of the corporations was gradually modified as the communal system was extended to the rural districts. In the United States the French model has been followed with the addition of many improvements, and where self-government has been impartially granted to the county, the township, and the village the purely municipal organization has lost its special significance. It

is regarded in the American courts as a revocable agency established by the State (without contract or consideration for the grant) for the purpose of carrying out the necessary details of civil government among the inhabitants of an urban district. It is considered to have no vested right to any of its powers or franchises, which are only allowed to exist in furtherance of the design for which the municipality was constituted, that object being the exercise in subordination to the legislature of certain minor powers of government over part of the territory of the State. Each city has the general powers of a corporation and no others, in the absence of special laws. It has executive functions and powers of legislation for civic purposes, which are vested in the mayor and his subordinate officers, but it is not in any other way intrusted with judicial authority.

MUNSTER. See IRELAND.

MÜNSTER, the chief town of the province of Westphalia, in Prussia, and formerly the capital of the important bishopric of its own name, lies in a sandy plain about half-way between Cologne and Bremen on the Aa, an insignificant affluent of the Ems. It is one of the best preserved old towns in Germany. Population (1890), 45,600.

MÜNSTER, SEBASTIAN, Hebraist, geographer, and mathematician, was born at Ingelheim, in the Palatinate, in 1489. From 1536 he taught at Basel, where he died of the plague on May 23, 1552.

MUNTJAK, one of the native names, now generally adopted in European languages, for a small group of Deer, the members of which are indigenous to the southern and eastern parts of Asia and the adjacent islands, and which are separated by very marked characteristics from all their allies. They are also called "Kijang" or "Kidjang," and constitute the genus *Cervulus* of Blainville and most zoölogists, *Styllocerus* of Hamilton Smith, and *Prox* of Ogilby.

The Muntjaks are solitary animals, very rarely even two being seen together. They are fond of hilly ground covered with forests, in the dense thickets of which they pass most of their time, only coming to the skirts of the woods at morning and evening to graze. They carry the head and neck low and the hind-quarters high, their action in running being peculiar and not very elegant, somewhat resembling the pace of a sheep, hence in southern India they bear the popular but erroneous name of "jungle sheep." Though with no power of sustained speed or extensive leap, they are remarkable for flexibility of body and facility of creeping through tangled underwood. Another popular name with Indian sportsmen is "barking deer," which is given on account of their alarm-cry, a kind of short, shrill bark, like that of a fox but louder, which may often be heard in the jungles they frequent both by day and by night. When attacked by dogs the males use their sharp, canine teeth with great vigor, inflicting upon their opponents deep and even dangerous wounds.

MÜNZER, THOMAS, was born of poor parents at Stolberg, in the Harz, in 1490, was educated at Halle and Leipsic, where he graduated in 1515, was a teacher in the Martini gymnasium in Brunswick in 1517, and was appointed in the beginning of 1520 preacher in the church of St. Mary at Zwickau. There he became the opponent of the friars on the one hand and of the humanist reformers on the other, while his eloquence, combined with his Christian socialism, gave him great power over the people. Wherever he went his Christian socialism was welcomed by the oppressed peasantry, who were encouraged to rise in the insurrection (Peasants' War) which ended so disastrously for them at Mühlhausen, 1525. After the battle Münzer was taken prisoner and executed.

MUNZINGER, WERNER, African traveler and linguist, was born at Olten, in Switzerland, April 4, 1832. In an expedition from Tadjura Bay to the kingdom of Shoa, Munzinger was killed, along with his wife and many of his companions, in an attack by a body of Gallas on November 14, 1875, in the neighborhood of Lake Assal.

MURÁDÁBÁD, or MORADABAD, a district in the lieutenant-governorship of the Northwestern Provinces of India. The area is 2,284 square miles. It lies within the great Gangetic plain, and is demarcated into three subdivisions by the rivers Rámangá and Sót. The district as a whole consists of a well-tilled and somewhat monotonous alluvial plain, unrelieved by any striking natural features.

The census of 1881 returned the population of the district, exclusive of non-Asiatics, at 1,155,173. Murádábád contains five municipal towns, viz.: Murádábád, 67,387; Amroha, 36,145; Sambhal, 35,196; Chandausi, 27,521; Dhanaura, 5,204.

MURÁDÁBÁD, town and headquarters of the above district, is situated on the right bank of the Rámangá river, with a population in 1881 of 67,387.

MURÆNA is the name of an eel common in the Mediterranean, and highly esteemed by the ancient Romans; it was afterward applied to the whole genus of fishes to which the Mediterranean species belongs, and which is abundantly represented in tropical and sub-tropical seas, especially in rocky parts or on coral reefs. Some ninety species are known.

Some of the tropical Murænas exceed a length of ten feet, but most of the species, among them the Mediterranean species, attain to only half that length.

MURAL DECORATION. There is scarcely one of the numerous branches of decorative art which has not at some time or other been applied to the ornamenting of wall-surfaces. It will be convenient to classify the various methods under different heads.

1. *Relief sculptured in Marble or Stone.*—This is the oldest method of wall-decoration, of which numerous examples still exist. The tombs and temples of Egypt are very rich in this kind of mural ornament of various dates, extending over the enormous period of nearly 5,000 years. These sculptures are, as a rule, carved in very low relief; in many cases they are "countersunk," that is, the most projecting parts of the figures do not extend beyond the flat surface of the ground. Some unfinished reliefs discovered in the rock-cut tombs of Thebes show the manner in which the sculptor set to work. The plain surface of the stone was marked out by red lines into a number of squares of equal size. The use of this was probably twofold: first, as a guide in enlarging the design from a small drawing, a method still commonly practiced; second, to help the artist to draw his figures with just proportions, following the very strict canons which were laid down by the Egyptians. No excessive realism or individuality of style arising from a careful study of the life-model was permitted. When the surface had been covered with these squares, the artist drew with a brush dipped in red the outlines of his relief, and then cut round them with his chisel.

When the relief was finished, it was, as a rule, entirely painted over, with much minuteness and great variety of colors. More rarely the ground was left the natural tint of the stone or marble, and only the figures and hieroglyphs painted. In the case of sculpture in hard basalt or granite the painting appears often to have been omitted altogether. The utter absence of perspective effects and the severe self-restraint of the sculptors in the matter of composition show a keen sense of artistic fitness in this kind of decoration. That the

stern rigidity of these sculptured pictures did not in any way arise from want of skill or observation of nature on the part of the artists is at once apparent when we examine their representations of birds and animals; with the most unerring skill and precision the special characteristics of each creature and species were caught by the ancient Egyptian and reproduced in stone or color, not literally, but in a half-symbolic way, suggesting exactly those peculiarities of form, plumage, or movement which are the essence and "differentia" of each, all other ideas bearing less directly on the point being carefully eliminated.

The subjects of these great mural sculptures are endless in their variety; almost every possible incident in man's life here or beyond the grave is reproduced with the closest attention to detail.

The above remarks as to style and manner of execution may be applied also to the wall-sculptures from the royal palaces of Nineveh and Babylon, the finest of which are shown by inscriptions to date from the time of Sennacherib to that of Sardanapalus, (from 705 to 625 B.C.) Very remarkable technical skill is shown in all these sculptures by the way in which the sculptors have obtained the utmost amount of effect with the smallest possible amount of relief, in this respect calling strongly to mind a similar peculiarity in the work of the Florentine Donatello.

Of a widely different class, but of considerable importance in the history of mural decoration, are the very beautiful reliefs, sculptured in stone and marble, with which Moslem buildings in many parts of the world are ornamented. These are mostly geometrical patterns of great intricacy and beauty, which cover large surfaces, frequently broken up into panels by bands of more flowing ornament of Arabic inscriptions. The mosques of Cairo, India, and Persia and the domestic Moslem buildings of Spain are extremely rich in this magnificent method of decoration. In western Europe, especially during the fifteenth century, stone paneled-work with rich tracery formed a large part of the scheme of decoration in all the more splendid buildings. Akin to this, though without actual relief, is the very sumptuous stone tracery—inlaid flush into rough flint walls—which was a mode of ornament largely used for enriching the exteriors of churches in the counties of Norfolk and Suffolk. It is almost peculiar to that district, and is an admirable example of the skill and taste with which the mediæval builders adapted their method of ornamentation to the materials which came naturally to hand.

2. *Marble Veneer*.—Another widely-used method of mural decoration has been the application of thin marble linings to wall-surfaces, the decorative effect being produced by the natural beauty of the marble itself and not by sculptured reliefs. One of the oldest buildings in the world, the so-called "Temple of the Sphinx" among the Gizeh pyramids, is built of great blocks of granite, the inside of the rooms being lined with slabs of beautiful semi-transparent African ababaster about three inches thick. In the first century very thin veneers of richly-colored marbles were largely used by the Romans to decorate brick and stone walls. Pliny speaks of this practice as being a new and degenerate invention in his time. Many examples exist at Pompeii and in other Roman buildings. Numerous Byzantine churches, such as St. Saviour's at Constantinople, and St. George's, Thessalonica, have the lower part of the internal walls richly ornamented in this way.

3. *Wall-Linings of Glazed Bricks or Tiles*.—This is a very important class of decoration, and from its almost imperishable nature, its richness of color, and its brill-

iance of surface is capable of producing a splendor of effect that can only be rivaled by glass mosaics. In the less important form—that of bricks modeled or stamped in relief with figures and inscriptions, and then coated with a brilliant color in silicious enamel—it was largely used by the ancient Egyptians and Assyrians as well as by the later Sasanians of Persia. In the eleventh and twelfth centuries the Moslems of Persia brought this art to great perfection, and used it on a large scale, chiefly, though not invariably, for internal walls. The main surfaces were covered by thick earthenware tiles, overlaid with a white enamel. These were not rectangular, but of various shapes, mostly some form of a star, arranged so as to fit closely together. Very delicate and minute patterns were then painted on the tiles, after the first firing, in a copper-like color with strong metallic luster, produced by the deoxidization of a metallic salt in the process of the second firing. Bands and friezes with Arabic inscriptions, modeled boldly in high relief, were used to break up the monotony of the surface. In these, as a rule, the projecting letters were painted blue, and the flat ground enriched with very minute patterns in the luster-color. This combination of bold relief and delicate painting produces great vigor and richness of effect, equally telling whether viewed in the mass or closely examined tile by tile. In the fifteenth century luster-colors, though still largely employed for plates, vases, and other vessels, especially in Spain, were but little used for tiles; and another class of ware, rich in the variety and brilliance of its colors, was extensively used by Moslem builders all over the Mohammedan world. The most sumptuous sorts of tiles used for wall-coverings are those of the so-called "Rhodian" and Damascus wares, the work of Persian potters at many places. Those made at Rhodes are coarsely executed in comparison with produce of the older potteries at Ispahan and Damascus (see POTTERY). These are rectangular tiles of earthenware, covered with a white "slip" and painted in the most brilliant colors with slightly conventionalized representations of various flowers, especially the rose, the hyacinth, and the carnation. The red used is a very rich harmonious color, applied in considerable body, so as to stand out in slight relief. Another class of design is more geometrical, forming regular repeats; but the most beautiful compositions are those in which the natural growth of trees and flowers is imitated, the branches and blossoms spreading freely over a large surface covered by hundreds of tiles without any repetition. One of the finest examples is the "Mecca wall" in the mosque of Ibráhím Agha, Cairo; and other Egyptian mosques are adorned in the same magnificent way.

Another important class of wall-tiles are those manufactured by the Spanish Moors, called "azulejos," especially during the fourteenth century. These are in a very different style, being designed to suggest or imitate mosaic. They have intricate interlacing geometrical patterns marked out by lines in slight relief; brilliant enamel colors were then burned into the tile, the projecting lines forming boundaries for the pigments. A very rich effect is produced by this combination of relief and color. They are mainly used for dados about four feet high, often surmounted by a band of tiles with painted inscriptions. The Alhambra and Generalife palaces at Granada, begun in the thirteenth century, but mainly built and decorated by Yúsuf I. and Mohammed V. (1333–1391 A.D.), and the Alcazar at Seville have the most beautiful examples of these "azulejos."

Almost peculiar to Spain are a variety of wall-tile, the work of Italians in the sixteenth and seventeenth centuries. These are effective, though rather coarsely painted, and have a rich yellow as the predominant color,

4. *Wall-Coverings of Hard Stucco, frequently enriched with Reliefs.*—The Greeks and Romans possessed the secret of making a very beautiful hard kind of stucco, creamy in color, and capable of receiving a polish like that of marble; it would stand exposure to the weather. Those of the early Greek temples which were built, not of marble, but of stone, such as the Doric temples at Ægina, Phigaleia, Præstum, and Agrigento, were all entirely coated inside and out with this beautiful material—itsself pleasant in both texture and hue, and an admirable surface for the further polychromatic decoration with which all Greek buildings seem to have been ornamented. Another highly artistic use of stucco among the Greeks and Romans for the interiors of buildings consisted in covering the walls and vaults with a smooth coat, on which, while still wet, the outlines of figures, groups, and other ornaments were sketched with a point; more stucco was then applied in lumps and rapidly modeled into delicate reliefs before it had time to set. Some tombs in Magna Græcia of the fourth century B.C. are decorated in this way with figures of nymphs, cupids, animals, and wreaths, all of which are models of grace and elegance, both in form and action, and extremely remarkable for the dexterous way in which a few rapid touches of the modeling tool or thumb have produced a work of the highest artistic beauty and spirit.

The Moslem architects of the Middle Ages, who excelled in almost all possible methods of mural decoration, made great use of stucco ornament in the most elaborate and magnificent way, for both external and internal walls. The stucco is modeled in high or low relief in great variety of geometrical patterns, of wonderful beauty and richness, alternating with bands of more flowing ornament, or long Arabic inscriptions.

During the sixteenth century, and even earlier, stucco wall-reliefs were used with considerable skill and decorative effect in Italy, England, and other Western countries.

5. *Sgraffito.*—This is a variety of stucco work used chiefly in Italy from the sixteenth century downward, and employed only for exteriors of buildings, especially the palaces of Tuscany and northern Italy. The process is this:—The wall is covered with a coat of stucco made black by an admixture of charcoal; over this a second very thin coat of white stucco is laid. When it is all hard the design is produced by cutting and scratching away the white skin, so as to show the black undercoat. Thus the drawing appears in black on a white ground.

6. *Stamped Leather.*—This was a very magnificent and expensive form of wall-hanging, chiefly used during the sixteenth and seventeenth centuries. Skins, generally of goats or calves, were well tanned and cut into rectangular shapes. They were then covered with silver leaf, which was varnished with a transparent lacquer, making the silver look like gold. The skins were then stamped or embossed with patterns in relief, formed by heavy pressure from metal dies, one in relief and the other sunk. The reliefs were then painted by hand in many colors, generally brilliant in tone. Italy and Spain (especially Cordova) were important seats of this manufacture; and in the seventeenth century a large quantity was produced in France.

7. *Painted Cloth.*—Another form of wall-hanging, used most largely during the fifteenth and sixteenth centuries, and in a less extensive way a good deal earlier, is canvas painted to imitate tapestry.

Many good artists working at Ghent and Bruges during the first half of the fifteenth century produced very fine work of this class, as well as designs for real tapestry. Several of the great Italian artists devoted their

utmost skill in composition and invention to the painting of these wall hangings.

8. *Printed Hangings and Wall-Papers.*—The printing of various textiles with dye colors and mordants is probably one of the most ancient of the arts. Pliny clearly describes a dyeing process employed by the ancient Egyptians, in which the pattern was probably formed by printing from blocks. Various methods have been used for this work—wood blocks in relief, engraved metal plates, stencil plates, and even hand-painting; frequently two or more of these methods have been employed for the same pattern. The use of printed stuffs is of great antiquity among the Hindus and Chinese, and was certainly practiced in western Europe in the thirteenth century, and perhaps earlier.

Wall-papers did not come into common use in Europe till the eighteenth century, though they appear to have been used much earlier by the Chinese. A few rare examples exist in England which may be as early as the sixteenth century; these are imitations, generally in flock, of the fine old Florentine and Genoese cut velvets, and hence the style of the design in no way shows the date of the wall-paper, the same traditional patterns being reproduced for many years with little or no change. Machinery enabling paper to be made in long strips was not invented till the end of the last century, and up to that time wall-papers were printed on small square pieces of hand-made paper, difficult to hang, disfigured by numerous joints, and comparatively costly. On these accounts wall-papers were slow in superseding the older and more magnificent modes of mural decoration, such as wood-paneling, painting, tapestry, stamped leather, and painted cloth.

Though at first wall-papers were a mere makeshift and feeble imitation of rich textiles, yet, with a good feeling for the harmonies of color and a regard for the technical necessities of the process, very rich and beautiful effects may be produced at a comparatively small cost if hand-printing be adopted. Imitations of stamped leather are now produced with great success, though of inferior durability. Very thick, tough paper is used for this, and treated in the same way as the real skins mentioned above.

PAINTING.

This is naturally the most important and the most widely used of all forms of wall-decoration, as well as perhaps the earliest.

Egyptian Paintings.—Egypt is the chief storehouse of ancient specimens of this, as of almost all the arts. Owing to the intimate connection between the sculpture and painting of early times, the remarks above, both as to subjects and treatment under the head of Egyptian wall-sculpture, will to a great extent apply also to the paintings. It is a very important fact, and one which testifies clearly to the enormous antiquity of Egyptian civilization, that the earliest paintings, dating more than 4,000 years before our era, are also the cleverest in both drawing and execution. In later times the influence of Egyptian art, especially in painting, was very important among even very distant nations. In the sixth century B.C. Egyptian colonists, introduced by Cambyses into Persepolis, largely influenced the painting and sculpture of the great Persian empire and throughout the valley of the Euphrates. In a lesser degree the art of Babylon and Nineveh had felt considerable Egyptian influence several centuries earlier. The same influence affected the early art of the Greeks and the Etrurians, and it was not till the middle of the fifth century B.C. that the further development and perfecting of art in Greece obliterated the old traces of Egyptian mannerism. After the death of Alexander the Great, when Egypt

came into the possession of the Lagidæ (320 B.C.), the tide of influence flowed the other way, and Greek art modified though it did not seriously alter the characteristics of Egyptian painting and sculpture, which still retained much of their early formalism and severity. And yet the increased sense of beauty, especially in the human face, derived from the Greeks, was counterbalanced by loss of vigor and force; art under the Ptolemies ceased to have a real life and became a mere dull copyism of earlier traditions.

The general scheme of mural painting in the buildings of ancient Egypt was very complete and magnificent. Columns, moldings, and other architectural features were enriched with patterns in brilliant colors; the flat wall-spaces were covered with figure-subjects, generally in horizontal bands, and the ceilings were richly ornamented with sacred symbols, such as the vulture, or painted blue and studded with gold stars to symbolize the sky. The wall-paintings are executed in tempera on a thin skin of fine lime, laid over the brick, stone, or marble to form a smooth and slightly absorbent coat to receive the pigments, which were most brilliant in tone and of great variety of tint. Not employing fresco, the Egyptian artists were not restricted to "earth colors," but occasionally used purples, pinks, and greens which would have been destroyed by fresh lime. The blue used is a very beautiful color, and is generally laid on in considerable body—it is frequently a "smalt" or deep blue glass, colored by copper oxide, finely powdered. Red and yellow ocher, carbon-black, and powdered chalk-white are most largely used.

Etruscan Painting.—The rock-cut sepulchers of the Etrurians supply the only existing specimens of their mural painting; and, unlike the tombs of Egypt, only a small proportion appear to have been decorated in this way. The actual dates of these paintings are very uncertain, but they range possibly from about the eighth century B.C. down to almost the Christian era. The tombs which possess these paintings are mostly square-shaped rooms, with slightly arched or gabled roofs, excavated in soft sandstone or tufa hillsides. The earlier ones show distinct Egyptian influence alike in drawing and in composition: they are very broadly designed with flat unshaded tints, the faces in profile, except the eyes, which are drawn as if seen in front. Colors, as in Egypt, are used conventionally—male flesh red, white or pale yellow for the females, black for demons. In one respect these paintings differ from those of the Egyptians; very few colors are used—red, brown, and yellow ochers, carbon-black, lime or chalk-white, and occasionally blue are the only pigments.

Greek Painting.—This is a very obscure subject, for, although Strabo, Pliny, Pausanias, and others have left us minute descriptions of Greek paintings and ample accounts of painters and styles, yet of the pictures themselves almost nothing now remains. Even in Egypt the use of color does not appear to have been more universal than it was among the Greeks, who applied it freely to their marble statues and reliefs, the whole of their buildings inside and out, as well as for the decoration of flat wall-surfaces. They appear to have cared but little for pure form, and not to have valued the delicate ivory-like tint and beautiful texture of their fine Pentelic and Parian marbles, except as a ground for colored ornament. A whole class of artists were occupied in coloring marble sculpture, and their services were very highly valued. In some cases, probably for the sake of hiding the joints and getting a more absorbent surface, the marble, however pure and fine in texture, was covered with a thin skin of stucco made of mixed lime and powdered marble. Among the extremely rare specimens of Greek painting still

existing, the most important is an alabaster sarcophagus, found in a tomb near Corneto, and now in the Etruscan museum at Florence. This is decorated outside with very beautiful and purely Greek paintings, executed on a stucco skin as hard and smooth as the alabaster itself. The pictures represent combats of the Greeks and Amazons, drawn with marvelous beauty of outline and grace of movement and composition. The coloring, though rather brilliant, is very simply treated, and the figures are kept strictly to one plane without any attempt at complicated perspective. Other most valuable specimens of Greek art, found at Herculaneum and now in the Naples museum, are some small paintings, one of the girls playing with dice, and another of Theseus and the Minotaur. These are painted with miniature-like delicacy on the bare surface of marble slabs; they are almost monochromatic, and are of the highest beauty both in drawing and in their skillfully-modeled gradations of shadow—quite unlike any of the Greek vase-paintings.

Greek mural painting, like their sculpture, was chiefly used to decorate temples and public buildings, and comparatively rarely for either tombs or private buildings—at least in the days of their early republican simplicity. They were in the true sense of the word works of monumental art, and were no doubt designed and executed with that strict self-restraint and due subordination to their architectural surroundings which we see so strongly marked in all Greek sculpture of the best periods.

Roman Painting.—A very large number of Roman mural paintings now exist, of which by far the greatest quantity was discovered in the private houses and baths of Pompeii, nearly all dating between 63 A.D., when the city was ruined by an earthquake, and 79 A.D., when it was buried by Vesuvius. A catalogue of these and similar paintings from Herculaneum and Stabiae, compiled by Professor Helbig, comprises 1,966 specimens. The excavations in the baths of Titus and other ancient buildings in Rome, made in the early part of the sixteenth century, excited the keenest interest and admiration among the painters of that time, and very largely influenced the later art of the Renaissance. These paintings, especially the "grotesques" or fanciful patterns of scroll-work and pilasters mixed with semi-realistic foliage and figures of boys, animals, and birds, designed with great freedom of touch and inventive power, seem to have thoroughly fascinated Raphael during his later period, and many of his pupils and contemporaries. The "loggie" of the Vatican and of the Farnesina palace are full of carefully-studied sixteenth-century reproductions of these highly-decorative paintings. Of late years the excavations on the Palatine and in the garden of the Farnesina in Rome have brought to light some mural paintings of the first century of our era, perhaps superior in execution even to the best of the Pompeian series.

The range of subjects found in Roman mural paintings is very large—mythology, religious ceremonies, genre, still life, and even landscape (the latter generally on a small scale, and treated in an artificial and purely decorative way), and lastly history. Pliny mentions several large and important historical paintings, such as those with which Valerius Maximus Messala decorated the walls of the Curia Hostilia, to commemorate his own victory over Hiero II. and the Carthaginians in Sicily in the third century B.C.

Early Christian Mural Paintings in Italy.—A very interesting series of these exists in various catacombs, especially those of Rome and Naples. They are of great value, both as an important link in the history of art and also as throwing considerable light on

the mental state of the early Christians, which was distinctly influenced by the older faith. Thus in the earlier paintings of about the fourth century we find Christ represented as a beardless youth, beautiful as the artist could make him, with a lingering tradition of Greek idealization, in no degree like the "Man of Sorrows" of mediæval painters, but rather a kind of genius of Christianity in whose fair outward form the peace and purity of the new faith were visibly symbolized, just as certain distinct attributes were typified in the persons of the gods of ancient Greece. The paintings of the fifth and sixth centuries still follow the classical lines, though in a rapidly deteriorating style, until the introduction of a foreign—the Byzantine—element, which created a fresh starting-point on quite different lines. The old naturalism and survival of classical freedom of drawing is replaced by stiff, conventionally hieratic types, very superior in dignity and strength to the feeble and spiritless compositions produced by the extreme degradation into which the native art of Rome had fallen. The designs of this second period of Christian art are very similar to those of the mosaics, such as many at Ravenna, and also to the magnificently illuminated MSS., on which the utmost skill and labor of the time were lavished. For some centuries there was but little change or development in this Byzantine style of art, so that it is impossible in most cases to be sure from mere internal evidence of the date of any painting. This to some extent applies also to the works of the earlier or pagan school, though, roughly speaking, it may be said that the least meritorious pictures are the latest in date.

It was not, in fact, till the second half of the thirteenth century that stiff traditional Byzantine forms and coloring began to be superseded by the revival of native art in Italy, by the painters of Florence, Pisa, and Siena (see FRESCO). During the first thirteen centuries of the Christian era mural painting appears to have been for the most part confined to the representation of sacred subjects. It is remarkable that during the earlier centuries, council after council of the Christian church forbade the painting of figure-subjects, and especially those of any person of the Trinity; but it was quite in vain. The double desire, both for the artistic effect of painted walls and for the religious teaching afforded by the pictorial representation of sacred scenes and the celebration of the sacraments, was too strong. In spite of the zeal of bishops and others, who sometimes with their own hands defaced the pictures of Christ on the walls of the churches, in spite of threats of excommunication, the forbidden paintings by degrees became more numerous, till the walls of almost every church throughout Christendom were decorated with whole series of pictured stories. The useless prohibition was becoming obsolete when, toward the end of the fourth century, the learned Paulinus, bishop of Nola, ordered the two basilicas which he had built at Fondi and Nola to be adorned with wall-paintings of sacred subjects, with the special object, as he says, of instructing and refining the ignorant and drunken people. These painted histories were in fact the books of the unlearned, and we can now hardly realize their value and importance as the chief mode of religious teaching in ages when none but the clergy could read or write.

English Mural Painting.—During the Middle Ages, just as long before among the ancient Greeks, colored decoration was used in the widest possible manner, not only for the adornment of flat walls, but also for the enrichment of sculpture and all the fittings and architectural features of buildings, whether the material to be painted was plaster, stone, marble, or wood. It was only the damp and frosts of northern climates that

to some extent limited the external use of color to the less exposed parts of the outsides of buildings. The varying tints and texture of smoothly-worked stone appear to have given no pleasure to the mediæval eye; and in the rare cases in which the poverty of some country church prevented its walls from being adorned with painted ornaments or pictures the whole surface of the stone-work inside, moldings, and carving as well as flat wall-spaces, was covered with a thin coat of whitewash. Internal rough stone-work was invariably concealed by stucco, forming a smooth ground for possible future paintings. Unhappily the ignorant barbarity of the nineteenth century has in the case of most English cathedrals and parish churches stripped off the internal plaster, often laying bare rubble walls of the roughest description, never meant to be exposed, and has scraped and rubbed the surface of the masonry and moldings down to the bare stone. In this way a great proportion of mural paintings have been destroyed, though many in a more or less limited state still exist in England. It is difficult (and doubly so since the so-called "restoration" of most old buildings) to realize the splendor of effect once possessed by every important mediæval church. From the tiled floor to the roof all was one mass of gold and color. The brilliance of the mural paintings and richly-colored sculpture and moldings was in harmony with the splendor of the oak-work—screens, stalls, and roofs—all richly decorated with gilding and painting, while the light, passing through stained glass, softened and helped to combine the whole into one even mass of extreme decorative effect. Color, and not in dull tints, was boldly applied everywhere, and thus the patchy effect was avoided which is so often the result of modern timid and partial use of painted ornament. Even the figure-sculpture was painted in a strong and realistic manner, sometimes by a waxencaustic process, probably the same as the *circumlitio* of classical times. In the accounts for expenses in decorating Orvieto cathedral wax is a frequent item among the materials used for painting. In one place it is specially mentioned that wax was supplied to Andrea Pisano (in 1345) for the decoration of the beautiful reliefs in white marble on the lower part of the west front.

Mural painting in England fell into disuse in the sixteenth century. For domestic purposes wood-paneling, stamped leather, and tapestry were chiefly used as wall-coverings. In the reign of Henry VIII., probably in part through Holbein's influence, a rather coarse sort of tempera wall-painting, German in style, appears to have been common.

MURANO, the ancient Ammariuno, an island in the Venetian lagoon about one mile north of Venice, is five miles in circumference, a large part of which is occupied by gardens. It contains about 4,000 inhabitants, but was once much more populous than it is at present, its inhabitants numbering 30,000. It was a favorite resort of the Venetian nobility before they began to build their villas on the mainland; and in the fifteenth and sixteenth centuries its gardens and casinos, of which some traces still remain, were famous. It was here that the literary clubs of the Vigilanti, the Studiosi, the Occulti, used to meet.

MURAT, JOACHIM, king of Naples and a celebrated French cavalry leader, was, according to most accounts, the younger son of an innkeeper at Bastide Fortunière, in the department of Lot, France, and was born in 1768, but by his own account his father was a well-to-do farmer in that village. This is most probably the truth. In November, 1791, he was elected by the department of Lot a member of the *garde constitutionnelle* of the king. In May, 1792, the *garde* was disbanded. When Bonaparte was requested by Barras

to undertake the defense of the convention in Vendémiaire, 1795, he at once called Murat to his side and commissioned him to bring up from Sèvres the artillery with which the sections were shot down. In the first battles of the famous campaign of 1796, Montenotte, Ceva, Dego, and Mondovì, Murat so greatly distinguished himself that he was chosen to carry the flags taken from the enemy to Paris.

In 1798 he was for a short time commandant at Rome, and then accompanied Bonaparte to Egypt. At the battle of the Pyramids he led his first famous cavalry charge, and so distinguished himself in Syria that he was made general of division. He returned to France with Bonaparte, and on the 18th Brumaire led into the orangery of Saint Cloud the sixty grenadiers whose appearance broke up the Council of Five Hundred. He was, after the success of the *coup d'état*, made commandant of the consular guard, and in January, 1800, married Marie Annonciade Caroline Bonaparte, the youngest sister of the first consul. He commanded the French cavalry at the battle of Marengo, and was afterward made governor in the Cisalpine Republic. He was made a marshal of France in 1804; he was titular governor of Paris, was invested with the grand eagle of the Legion of Honor, and appointed grand admiral of France with the title of prince in 1805. He commanded the cavalry of the grand army in the German campaign of 1805, and was so conspicuous at Austerlitz that Napoleon made him grand-duke of Berg and Cleves. He commanded the cavalry at Jena, Eylau, and Friedland, and in 1808 was made general-in-chief of the French armies in Spain. He entered Madrid on March 25, and did much to hurry on the Spanish policy of Napoleon. The inhabitants of Madrid showed their hatred for the French by murdering, on May 2d, all the isolated or wounded Frenchmen they could find. Murat vigorously put down the riot, but not cruelly, for only 158 Spaniards fell to 500 Frenchmen; and he hoped for the throne of Spain as his reward. But the throne of Spain was given to Joseph Bonaparte, and Murat received Joseph's former kingdom of Naples.

King Joachim Napoleon, as he called himself, entered Naples in September, 1808, and soon won great popularity by his handsome presence and his gayety of manner. He took Capri from the English, and organized a Neapolitan army of 80,000 infantry and 10,000 cavalry. But his attention was not confined to military matters; he effected other great reforms in finally abolishing all relics of feudalism and putting down brigandism. Unfortunately much injustice was done by General Manhès in this last reform, which seriously affected Murat's popularity in Calabria. He was not present at Aspern or Wagram, but once more commanded the cavalry of the grand army in the Russian campaign of 1812. He manifested his usual headlong valor in the disastrous retreat, but, being offended by Napoleon, he suddenly threw up his command and left for Naples. He then began an intrigue with Austria. Whether it was that he hoped to escape from a doubtful cause or that he was really offended by Napoleon's preference for Eugène Beauharnais is not known, but in March, 1813, he sent Prince Cariati to Vienna to declare that he would surrender his claims to Sicily if Austria would guarantee Naples to him. In January, 1814, the alliance with Austria was declared by Murat's seizing the principality of Benevento, while Austria promised him Ancona for a force of 30,000 men. At the congress of Vienna his independence was attacked by Talleyrand, who was his personal enemy, and it was as much from distrust of Austria as anything else that he declared in March, 1815, that he intended to restore the unity and independence of Italy. He had hoped

that Lord William Bentinck, the English general, would have supported him, but in vain. The Austrians steadily advanced, and on May 2d he suffered a disastrous defeat at the battle of Tolentino. With difficulty he escaped, and reached France on May 27th. He offered his sword to Napoleon, who indignantly refused his offer, and he then hid in seclusion near Toulon with a price upon his head. After Waterloo he was refused an asylum in England, and went to Corsica, where he was joined by a few rash spirits, who urged him to strike another blow for his kingdom of Naples. He refused an offer of asylum from Metternich, and started with six ships. By a great mistake he landed in Calabria, where he was hated for the cruelty of Manhès, on October 6th; his ships deserted him, and he was taken prisoner by a captain named Trenta-Capilli, whose brother had been executed by Manhès. He was imprisoned in the fort of Pizzo, and on October 13, 1815, was tried by court-martial, under a law of his own, for disturbing the public peace and was sentenced to be shot in half an hour. After writing a touching letter of farewell to his wife and children, he bravely met his fate, and was buried at Pizzo.

MURATORI, LUDOVICO ANTONIO, a learned Italian scholar, historian, and antiquary, was born at Vignola, in the duchy of Modena, October 21, 1672, and died in 1750.

MURCHISON, SIR RODERICK IMPEY, geologist, was born at Tarradale, in Eastern Ross-shire, Scotland, February 19, 1792. Young Murchison left the Highlands when only three years old, and at the age of seven was sent to the grammar school of Durham, where during six years he received the only connected general education he ever obtained. He was then placed at the military college, Great Marlow, to be trained for the army. With some difficulty he succeeded in passing the not very stringent examinations of the time, and at the age of fifteen was gazetted ensign in the Thirty-sixth regiment. A year later (1808) he landed with Wellesley in Galicia, and was present at the actions of Rorica and Vimiera. Subsequently under Sir John Moore he took part in the retreat to Coruña and the final battle there.

Returning to England in 1818, he sold his paternal property in Ross-shire and settled in England, where he joined the Geological Society of London, and soon showed himself one of its most active members, having as his colleagues there such men as Sedgwick, Lyell, Buckland, Herschel, Whewell, and Babbage.

Turning his attention for a little to Continental geology, he explored with Lyell the volcanic region of Auvergne, parts of southern France, northern Italy, Tyrol, and Switzerland. A little later, with Sedgwick as his companion, he attacked the difficult problem of the geological structure of the Alps, and their joint paper giving the results of their study will always be regarded as one of the classics in the literature of Alpine geology.

It was in the year 1831 that Murchison found the field in which the chief work of his life was to be accomplished. Acting on a suggestion made to him by Buckland, he betook himself to the borders of Wales, with the view of endeavoring to discover whether the graywacke rocks underlying the Old Red Sandstone could be grouped into a definite order of succession as the Secondary rocks of England had been made to tell their story by William Smith. For several years he continued to work vigorously in that region. The result was the establishment of the Silurian system—a definite section of the geological record.

The establishment of the Silurian system was followed by that of the Devonian system, an investigation in

which Sedgwick and Murchison were fellow-laborers, both in the southwest of England and in the Rhinelands. Soon afterward Murchison projected an important geological campaign in Russia with the view of extending to that part of the Continent the classification he had succeeded in elaborating for the older rocks of western Europe. He was accompanied by De Verneuil and Keyserling, in conjunction with whom he produced a magnificent work on *Russia and the Ural Mountains*.

In 1846 he was knighted, and later in the same year he presided over the meeting of the British Association at Southampton. During the later years of his life a large part of his time was devoted to the affairs of the Royal Geographical Society, of which he became president.

In the year 1855 Murchison was appointed director-general of the geological survey and director of the Royal School of Mines and Geological Museum, Jermyn street, London, in succession to Sir Henry de la Beche, who had been the first to hold these offices.

One of the closing public acts of Murchison's life was the founding of a chair of geology and mineralogy in the university of Edinburgh, for which he gave the sum of £6,000, an annual sum of £200 being likewise provided by a vote in parliament for the endowment of the professorship. While the negotiations with the government in regard to this subject were still in progress, Murchison was seized with a paralytic affection on November 21, 1870. At first his life was in danger, but he eventually rallied, and was able to see his friends, read, and take interest in current affairs until the early autumn of the following year, when his malady began to make rapid progress. At last, after a brief attack of bronchitis, he died October 22, 1871.

MURCIA, a maritime province of southeastern Spain, is bounded on the east and south by Alicante and the Mediterranean, on the west by Almeria and Granada, and on the north by Albacete, and has an area of 4,478 square miles; the population of the province in 1877 was 451,611. Besides the cities of Murcia, Cartagena, and Lorca, the following towns in that year had a population exceeding 5,000:—Abanilla, Águilas, Alhama, Bullas, Caravaca, Cehegin, Cieza, Fortuna, Fuente-Álamo, Jumilla, Mazarron, Molina, Moratalla, Mula, Torre-Pacheco, Totana, La Union, Yecla.

MURCIA, a city of Spain, capital of the above province. Murcia has been the seat of the bishop of Cartagena since 1261; the present palace was erected in 1748-52. Near it are the colleges of San Fulgencio and San Isidoro. The population in 1877 was 91,805.

MURDER, MANSLAUGHTER. In the law of England (and with some statutory modifications, of the United States) the unlawful killing of a human being is either murder or manslaughter according as it is or is not accompanied by circumstances constituting the element of malice aforethought. That, according to the old definition of Coke, is the criterion by which murder is distinguished from manslaughter. In like manner Blackstone lays it down as a "general rule" that all homicide is in the eye of the law malicious, and therefore murder, unless it is either *justified* by the command or permission of the law, *excused* on account of accident or self-preservation, or *alleviated* into manslaughter by being the involuntary consequence of some act not strictly lawful, or occasioned by some sudden and sufficiently violent provocation. An exact account of these related offenses can only be obtained by an examination of a vast number of judicial decisions, most of which are to be found in the ordinary text-books. "Manslaughter is unlawful homicide without malice aforethought. Murder is unlawful homicide with malice aforethought. Malice aforethought means any one or

more of the following states of mind preceding or coexisting with the act or omission by which death is caused, and it may exist when that act is unpremeditated: (a) an intention to cause the death of, or grievous bodily harm to, any person, whether such person is the person actually killed or not; (b) knowledge that the act which causes death will probably cause the death of, or grievous bodily harm to, some person, whether such person is the person actually killed or not, although such knowledge is accompanied by indifference whether death or grievous bodily harm is caused or not, or by a wish that it may not be caused; (c) an intent to commit any felony whatever; (d) an intent to oppose by force any officer of justice on his way to, on, or returning from the execution of the duty of arresting, keeping in custody, or imprisoning any person whom he is lawfully entitled to arrest, keep in custody, or imprison, or the duty of keeping the peace or dispersing an unlawful assembly, provided that the offender has notice that the person killed is such an officer so employed." The expression "officer of justice" in this clause includes every person who has a legal right to do any of the acts mentioned, whether he is an officer or a private person. Notice may be given either by word, by the production of a warrant or other legal authority, by the known official character of the person killed, or by the circumstances of the case. Art. 224 of Justice Stephen's *Digest of the Criminal Law*, states that "homicide which would otherwise be murder is not murder but manslaughter if the act by which death is caused is done in the heat of passion, caused by provocation," the acts amounting to which are enumerated. But provocation does not extenuate the offense "unless the person provoked is at the time when he does the act deprived of the power of self-control by the provocation which he has received, and in deciding the question whether this was or was not the case regard must be had to the nature of the act by which the offender caused death, to the time which elapsed between the provocation and the act which caused death, to the offender's conduct during that interval, and to all other circumstances tending to show the state of his mind."

The most notable difference between England and the United States in regard to the law on this subject is the recognition by recent State legislation of degrees in murder. English law treats all unlawful killing not reducible to manslaughter as of the same degree of guilt. American statutes seek to discriminate between the graver and the less serious forms of the crime. Thus an Act of the legislature of Pennsylvania (April 22, 1794) declares all murder which shall be perpetrated by means of poison or by lying in wait or by any other kind of willful, deliberate, and premeditated killing, or which shall be committed in the perpetration of or attempt to perpetrate any arson, rape, robbery, or burglary, shall be deemed murder of the first degree; and all other kinds of murder shall be deemed murder of the second degree. This statute, says Bishop, "is the parent of all the others." In Michigan it has been enacted in exact words; and in most of the other States which have adopted this line of legislation the departure from the language of the Pennsylvania provision is not such as calls for the application of different principles of interpretation. It is pointed out by Bishop that the language used in these statutes to discriminate the degrees of murder is similar to that by which the common law distinction between murder and manslaughter is usually expressed. Thus in Massachusetts murder committed with "deliberately premeditated malice aforethought" is in the first degree. In Indiana the expression used is "purposely and of deliberate and premeditated malice."

MURDOCK, WILLIAM, inventor, was born near the village of Auchinleck, in Ayrshire, on August 25, 1754. He retired from business in 1830, and died in 1839.

MURE, WILLIAM, historian of Greek literature, was born at the family seat near Caldwell, Ayrshire, Scotland, July 9, 1799, and died in 1860.

MURET, or MURETUS, MARC ANTOINE, French humanist, was born at Muret, near Limoges, on April 12, 1526. He died in 1585.

MURGER, HENRY, French man-of-letters, was born in February, 1822, at Paris. His father was a *concierger*, with which employment he combined the trade of tailoring. At the age of fifteen Murger was sent into a lawyer's office, but the occupation was very uncongenial to him, and his father's trade still more so. He thus incurred the paternal displeasure, and in his devotion to literature and liberty began to meet with not a few of the hardships which he afterward described. He was, however, for a time saved from actual want by the employment of secretary to the Russian Count Tolstoy, which was procured for him by M. de Jouy (an old academician of the classical faction, but a very kind friend to youthful literary aspirants) in the year 1838. For the next ten years little positive is known of Murger's life except that it probably provided the experiences, and certainly supplied him with the ideas, of his most famous book. He made his first independent appearance as an author in 1843 with a book entitled *Vie Dolorosa*, but it made no mark. He also tried journalism, and the paper *Le Castor*, which figures in the *Vie de Bohême*, and which combined devotion to the interests of the hat trade with recondite philosophy and elegant literature, is said to have been a fact, though a shortlived one. At length he was introduced to better work, either in the *Corsaire*, then a favorite organ of the second romantic generation, or in the *Artiste*; for both stories are told. In 1848 appeared the collected sketches called the *Vie de Bohême*. This book, which is of its kind famous, describes the fortunes and misfortunes, the loves, studies, amusements, and sufferings, of a group of impecunious students, artists, and men of letters, of whom Rodolphe represents Murger himself, while the others have been more or less positively identified. Murger, in fact, belonged to a set or clique of so-called Bohemians, the most remarkable of whom, besides himself, were Privat d'Anglemon and Champfleury.

From the date above mentioned it was perfectly easy for him to make a comfortable living by journalism and general literature. He was introduced in 1851 to the *Revue des Deux Mondes*, and contributed to it for two or three years, and he never had any difficulty in securing or keeping literary employment. But he was a slow, a fastidious, and a very capricious worker, and his years of hardship and dissipation had very seriously impaired his health. He continued, however, to produce work pretty regularly, publishing *Claude et Marianne* in 1851, *Le Dernier Rendezvous* and *Le Pays Latin* in 1852; *Adeline Protat* (one of the most graceful and innocent if not the most original of his tales) in 1853, and *Les Buveurs d'Eau* in 1854. This last, the most powerful of his books next to the *Vie de Bohême*, exhibits a reverse side to the picture by tracing the fate of certain artists and students who, exaggerating their own powers and foolishly disdaining merely profitable work, come to an evil end not less rapidly if more respectably than by dissipation. Some years before his death, which took place in a *maison de santé* near Paris on January 28, 1861, Murger went to live at Marlotte, near Fontainebleau, and it was there that he wrote, and in 1859 published, an unequal book entitled *Le Sabot Rouge*, in which the character of the French peasant is very uncomplimentarily treated. Besides the books already

mentioned, Murger's published works fill several volumes of prose and one of verse. The poems contained in the latter (*Les Nuits d'Hiver*) are not very strong, but graceful and frequently pathetic.

MURILLO, BARTOLOMÉ ESTEBAN, the greatest ecclesiastical painter of Spain, was the son of Gaspar Esteban Murillo and Maria Perez, and was born at Seville in 1617, probably at the very end of the year, as he was baptized on January 1, 1618. His parents resolved to place him under the care of their distant relative, Juan del Castillo, the painter. Murillo in a few years painted as well as his master, and as stiffly. Struck by the favorable change which travel had wrought upon the style of his brother artist Pedro de Moya, Murillo in 1642 resolved to make a journey to Flanders or Italy in quest of further insight into art. But how was he, already struggling for existence and with a poor sister dependent on him, to raise the means necessary for such an expedition? Having bought a large quantity of canvas, he cut it into squares of different sizes, which he converted into pictures of a kind likely to sell. The American traders at once bought up his pieces, and he now found himself sufficiently rich to carry out his much-cherished design. He placed his sister under the care of some friends, and without divulging his plans to any one set out for Madrid. On reaching the capital he waited on Velazquez, his fellow-townsmen, the great court-painter, then at the summit of his fortune, and, communicating to him his simple story, asked for some introduction to friends in Rome. The master liked what he saw of the manly youth, and in the noblest manner offered him lodging in his own house, and proposed to procure him admission to the royal galleries of the capital. Murillo accepted the offer, and here enjoyed the masterpieces of Italy and Flanders without traveling beyond the walls of Madrid. The next two years were chiefly spent in copying from Ribera, Vandyck, and Velazquez; and in 1644 he so greatly astonished the latter with some of his efforts that they were submitted to the inspection of the king and the court. His patron now urged him to go to Rome, and offered him letters to smooth his way; but Murillo, from whatever cause, preferred returning to his sister and his native Seville.

The friars of the convent of San Francisco in Seville had about this time piously determined to adorn the walls of their small cloister in a manner worthy of their patron saint. But the brotherhood had no money; and after endless begging they still found themselves incapable of employing an artist of name to execute the task. Murillo was needy, and offered his services; after balancing their own poverty against his obscurity the friars bade him begin. Murillo covered the walls with eleven large pictures of remarkable power and beauty, displaying by turns the strong coloring of Ribera, the lifelike truthfulness of Velazquez, and the sweetness of Vandyck. Among them were to be found representations of San Francisco, of San Diego, of Santa Clara, and of San Gil. These pictures were executed in his earliest style, commonly called his *frio* or cold style. It was chiefly on Ribera and Caravaggio, and was dark with a decided outline. This rich collection is no longer to be met with in Seville; Marshal Soult carried off ten of the works. The fame of these striking productions soon got abroad, and "El Claustro Chico" swarmed daily with artists and critics. Murillo was no longer friendless and unknown. The rich and the noble of Seville overwhelmed him with their commissions and their praises.

In 1648 Murillo married a wealthy lady of rank, Doña Beatriz de Cabrera y Sotomayor, of the neighborhood of Seville and his house soon became the favorite resort

of artists and connoisseurs. About this time he was associated with the landscape-painter Yriarte—the two artists interchanging figures and landscapes for their respective works; but they did not finally agree, and the coöperation came to an end. Murillo now painted the well-known *Flight into Egypt*, and shortly afterward changed his earliest style of painting for his *calido* or warm style. His drawing was still well defined, but his outlines became softer and his figures rounder, and his coloring gained in warmth and transparency. His first picture of this style, according to Cean Bermudez, was a representation of Our Lady of the Conception, and was painted in 1652 for the brotherhood of the True Cross; he received for it 2,500 reals (\$130). In 1655 he executed his two famous paintings of *San Leandro* and *San Isidoro* at the order of Don Juan Federigo, archdeacon of Carmona, which are now to be seen in the cathedral of Seville. These are two noble portraits finished with great care and admirable effect, but the critics complain of the figures being rather short. His next picture, the *Nativity of the Virgin*, painted for the chapter, is regarded as one of the most delightful specimens of his *calido* style. In the following year (1656) the same body gave him an order for a vast picture of San Antonio de Padua, for which he received 10,000 reals (\$520). This is one of his most celebrated performances, and still hangs in the baptistery of the cathedral. The same year saw him engaged on four large pictures of a semicircular form, designed by his fast friend and patron Don Justino Neve y Yevenes, to adorn the walls of the church of Santa Maria la Blanca. The first two were meant to illustrate the history of the festival of Our Lady of the Snow, or the foundation of the Roman basilica of Santa Maria Maggiore. The one represents the wealthy but childless Roman senator and his lady asleep and dreaming; the other exhibits the devout pair relating their dream to Pope Liberius. Of these two noble paintings the *Dream* is the finer, and in it is to be noticed the commencement of Murillo's third and last style, known as the *vaporoso* or vapory. In the *vaporoso* method the well-marked outlines and careful drawing of his former styles disappear, the outlines are lost in the misty blending of the light and shade, and the general finish betrays more haste than was usual with Murillo. After many changes of fortune, these two pictures now hang in the Academy of San Fernando at Madrid.

In 1658 Murillo undertook and consummated a task which had hitherto baffled all the artists of Spain, and even royalty itself. This was the establishing of a public academy of art. By superior tact and good temper he overcame the vanity of Valdes Leal and the presumption of the younger Herrera, and secured their coöperation. The Academy of Seville was accordingly opened for the first time in January, 1660, and Murillo and the second Herrera were chosen presidents. The former continued to direct it during the following year; but the calls of his studio induced him to leave it, now flourishing and prosperous, in other hands.

Passing over some half-length pictures of saints and a dark-haired Madonna, painted in 1668 for the chapter-room of the cathedral of his native city, we enter upon the most splendid period of Murillo's career. In 1661 Don Miguel Mañara Vicentelo de Leca, who had recently turned to a life of sanctity from one of the wildest profligacy, resolved to raise money for the restoration of the dilapidated Hospital de la Caridad, of whose pious guild he was himself a member. Mañara commissioned his friend Murillo to paint eleven pictures for this edifice of San Jorge. Three of these pieces represented the Annunciation of the Blessed Virgin, the Infant Savior, and the Infant St. John. The remaining eight are considered Murillo's masterpieces. They

consist of *Moses Striking the Rock*, *The Return of the Prodigal*, *Abraham Receiving the Three Angels*, *The Charity of San Juan de Dios*, *The Miracle of the Loaves and Fishes*, *Our Lord Healing the Paralytic*, *St. Peter Released from Prison by the Angel*, and *St. Elizabeth of Hungary*. These works occupied the artist four years, and in 1674 he received for his eight great pictures 78,115 reals or about \$4,000. The *Moses*, the *Loaves and Fishes*, and the *San Juan* are still to be found at Seville; but the French carried off the rest. The front of this famous hospital was also indebted to the genius of Murillo; five large designs in blue glazed tiles were executed from his drawings. He had scarcely completed the undertakings for this edifice when his favorite Franciscans again solicited the aid of his pencil. He accordingly executed some twenty paintings for the humble little church known as the Convent de los Capucinos. Seventeen of these Capuchin pictures are still preserved in the Museum of Seville. Of these the *Charity of St. Thomas of Villanueva* is reckoned the best. Another little piece of extraordinary merit, which once hung in the church, is the *Virgin of the Napkin*, believed to have been painted on a "servilleta" and presented to the cook of the Capuchin brotherhood as a memorial of the artist's pencil.

In 1670 Murillo is said to have declined an invitation to court, preferring to labor among the brown coats of Seville. Eight years afterward his friend the canon Justino again employed him to paint three pieces for the Hospital de los Venerables; the *Mystery of the Immaculate Conception*, *St. Peter Weeping* and the *Blessed Virgin*. As a mark of esteem Murillo next painted a full-length portrait of the canon, in which all the artist's skill is visible. The sleek spaniel reposing at the feet of the priest has been known before now to call forth a snarl from a living dog as he approached it. His portraits generally, though few, are of great beauty. Toward the close of his life Murillo executed a series of pictures illustrative of the life of "the glorious doctor" for the Augustinian convent at Seville. This brings us to the last work of the artist. Mounting a scaffolding one day at Cadiz (whither he had gone in 1681), to execute the higher parts of a large picture of the *Espousal of St. Catherine*, on which he was engaged for the Capuchins of that town, he stumbled, and fell so violently that he received a hurt from which he never recovered. The great picture was left unfinished, and the artist returned to his beloved Seville only to die. He died as he had lived, a humble, pious, brave man, on April 3, 1682, in the arms of the chevalier Pedro Nuñez de Villavicencio, an intimate friend and one of his best pupils.

MUROM, a district town of Russia, in the province of Vladimir, on the craggy left bank of the Oka close by its junction with the Tesha, 107 miles by rail southeast of Vladimir. The population is 11,000.

MURPHY, ARTHUR, dramatist, was the son of a Dublin merchant, and was born near Elphin, in Roscommon, in 1727. He died in June, 1805.

MURPHY, ROBERT, mathematician, was the son of a poor shoemaker, and was born in Mallow, in Ireland, in 1806. He died in 1843.

MURRAIN, a term usually restricted to extensive outbreaks of disease in cattle, but also applied to serious disorders among sheep and pigs, is taken in this article to cover general or infectious disorders of all the domesticated animals, and as synonymous with plague or epizooty. We here mention the best known and most destructive forms of murrain.

1. *Anthrax*.—This is one of the most diffused and interesting of murrains, affecting, as it does, wild as well as domesticated animals. It prevails, in one or more of its forms, over the entire surface of the globe.

Symptoms.—These vary according as the disease runs its course as a general or localized affection. While death is usually rapid or sudden when the malady is general, constituting what is designated splenic apoplexy or anthrax fever, in the local form, marked by the formation of carbuncles before general infection occurs, it is more protracted. In the apoplectic form there is apparently no local manifestation, and dissolution may take place so quickly (in a few minutes) that there is no time to afford relief. One or more of the best-conditioned and perhaps robust animals in a herd or flock, which until then exhibited no sign of the disease, are suddenly struck down as if shot, while grazing, feeding in the stable, or traveling, and rise no more. Or they commence all at once to tremble or stagger; the breathing becomes hurried and the pulse very rapid, while the heart beats violently; the internal temperature of the body is high; blood flows from the nose, mouth, and anus; the visible mucous membranes are almost black in tint; and death soon supervenes, being immediately preceded by delirium, convulsions, or coma. In some cases the animal rallies from a first attack, but soon a second ensues, to which it speedily succumbs, the creature in the interval remaining drowsy and showing muscular tremors. In the carbuncular form the tumors may appear in any part of the body, being preceded or accompanied by fever. When the tongue is affected, the disease is usually known as blain of the tongue, tongue evil, or glossanthrax.

Anthrax in all its forms is an inoculable disease, transmission being surely and promptly effected by this means, and it may be conveyed to nearly all animals either by inoculation or through the digestive organs. The abraded skin is often the channel for the introduction of the bacilli; and persons who handle diseased animals or their products—as flesh, skin, wool, or hair—often die from anthrax, which presents similar symptoms in mankind to those it exhibits in animals. The bacillus of anthrax, under certain conditions, retains its vitality for a long time, and rapidly grows when it finds a suitable fluid in which to develop, its mode of multiplication being by scission and the formation of spores, and depending, to a great extent at least, on the presence of oxygen. The morbid action of the bacillus is indeed said to be due to its affinity for oxygen; by depriving the red corpuscles of the blood of that most essential gas, it renders the vital fluid unfit to sustain life. Others assert that the fatal lesions are produced by the enormous number of bacilli blocking up the minute blood-vessels, especially of the lungs, and thus inducing asphyxia.

It was by the cultivation of this micro-organism, or attenuation of the virus, that Pasteur has been enabled to produce a prophylactic remedy for anthrax, which has already been demonstrated to be very effective; and his discovery is likely to lead to most important results in procuring protective agents for other similar and fatal disorders in man and beast. Though his discovery was first made with regard to the cholera of fowls, a most destructive disorder which annually carries off great numbers of poultry, yet as applied to anthrax it has attracted most attention. This so-called attenuation or cultivation of the virus of the disease by Pasteur is effected by growing the bacillus in an albuminous fluid, the preference being given to chicken-broth, which has been previously sterilized by being raised to a temperature of 115° C. This broth is inoculated with a drop of anthrax blood which has been taken with antiseptic precautions from an animal about to die of the disease; it is kept in pure air at a temperature of 42° to 43° C.; at 45° the process of cultivation will not go on. After a certain time another quantity of broth is inoculated

with a drop of the first, and kept under the same conditions; and so this cultivation is carried on until a sufficient number of the generations of the bacilli have been grown and the required degree of attenuation insured. This is attained by attention to the temperature, allowing a certain interval to elapse between each inoculation of the broth and the number of generations cultivated. The resulting "vaccine," as it has been improperly designated, when inoculated into the body of an animal liable to anthrax, confers immunity from the disease, if certain rules are attended to.

Toussaint had, previous to Pasteur, attenuated the virus of anthrax by the action of heat; and Chauveau has more recently corroborated by numerous experiments the value of Toussaint's method, demonstrating that, according to the degree of heat to which the virus is subjected, so is its innocuousness when transferred to a healthy creature. The attenuation of heat, according to this method, is a safer and readier way to obtain a protective virus than Pasteur's broth cultivations.

2. *Cattle Plague or Rinderpest.*—The next disease is that which has, since the commencement of the last century, been generally described as "the murrain," but which is now better known as the "cattle-plague" or "rinderpest" (German).

Symptoms.—Among cattle indigenous to the regions in which this malady may be said to be enzoötic the symptoms are often comparatively slight, and the mortality not great. In these the indications of fever are usually of brief duration, and signs of lassitude and debility are, in some instances, the only marks of the presence of this virulent disorder in animals which may, nevertheless, communicate the disease in its most deadly form to the cattle of other countries. Slight diarrhea may also be present, and a cutaneous eruption accompanied by gastric disturbance, shedding of tears, and infrequent cough. In the more malignant form the fever runs very high, sometimes to 107.6° Fahr., and all the characteristic symptoms of the disorder are well marked, the lesions during life being observed in the cheese-like deposits on the gums, the presence of petechiæ on the mucous membranes, discharges from the eyes, nose, and mouth, eruption on the skin, cough and labored breathing, certain nervous phenomena, and dysenteric dejections. Death generally occurs in four or five days, the course of the disorder being more rapid with animals kept in stables than with those living in the open air, and in summer than in winter. After death the chief alterations are found in the digestive canal, and consist in evidence of inflammation of a more or less acute kind, with ulceration, extravasation of blood, gangrene, etc. The membrane lining the air-passages offers similar alterations; indeed, all the mucous membranes of the body appear to be involved, and the malady might almost be considered as a malignant infectious catarrhal fever.

Protective inoculation has often been advocated and practiced (particularly in Russia) for this disorder, but the advantages derived have not been sufficient to compensate for the danger attending it. Semmer, of the Dorpat veterinary school, made experiments with cultivated or attenuated virus, and the results have been encouraging.

3. *Pleuro-Pneumonia or Lung Plague.*—The next murrain in importance, with regard to destructiveness, is the so-called "lung-plague" or contagious "pleuro-pneumonia" of cattle.

This disease is particularly interesting from the fact that within less than two centuries it has been spread from a very small area over nearly every part of the world. In its nature it is a specific infectious disease, generally affecting the lungs and the lining membrane of the chest, producing a particular form of lobar or lobu-

lar pleuro-pneumonia, and in the majority of cases, if not in all, it is transmitted through the medium of the inspired air—hence its localization in the lungs. Inoculation with the fluid from the diseased lungs does not produce any effect on other than the bovine species; but in this its action is most energetic. Producing after a certain interval, characteristic lesions at the seat of inoculation, the morbid change or infective process soon involves parts beyond, and if not checked may cause most serious damage and even the death of the inoculated animal; though it does not develop the lung lesions always observed in accidental infection, yet there is a local anatomical similarity or identity.

Symptoms.—The malady is slow and insidious in its course, lasting from two to three weeks to as many months, the chief symptoms being fever, diminished appetite, a short cough of a peculiar and pathognomonic character, with quickened breathing and pulse, and physical indications of lung and chest disease. The progress of the malady is marked by exacerbation of the symptoms, and toward the end there is great debility and emaciation, death generally ensuing after hectic fever has set in. Recovery is somewhat rare.

The pathological changes are generally limited to the chest and its contents, and consist in a peculiar marbled-like appearance of the lungs on section, and fibrinous deposits on the pleural membrane, with oftentimes great effusion into the cavity of the thorax. Willems of Hasselt (Belgium) in 1852 introduced and practiced inoculation as a protective measure for this scourge, employing for this purpose the serum obtained from a diseased lung; and his success was so marked that he made known his procedure. Since that time inoculation has been extensively resorted to, not only in Europe, but also in America, Australia and South Africa; and its protective value has been generally recognized. When properly performed, and when certain precautions are adopted, it would appear to confer immunity from the disease. The usual seat of inoculation is the extremity of the tail, the virus being introduced beneath the skin by means of a syringe or a worsted thread impregnated with the serum. One or two drops are sufficient to cause the local and constitutional disturbance which mark successful prophylactic infection. A particular micro-organism has been discovered in the diseased textures and fluids of animals affected with contagious pleuro-pneumonia, which is supposed to cause the malady. It has been cultivated, and inoculation experiments have been made with it. The intravenous injection of the virus has been found to be a safer method of conferring immunity than inoculation beneath the skin, and quite as certain a method.

4. *Foot-and-Mouth-Disease* (Epizootic Aphtha, Eczema epizootica). During this century, owing to the vastly-extended commercial relations between every civilized country, it has, like the lung-plague, become widely diffused. In the Old World its effects are now experienced from the Caspian Sea to the Atlantic Ocean. It gradually extended toward Britain at the commencement of this century, after invading Holland and Belgium, and about 1839 appeared in England, where it was immediately recognized as a new disease; it quickly spread over the three kingdoms. From the observations of the best authorities it would appear to be an altogether exotic malady in the west of Europe, always invading it from the east; at least, this has been the course noted in all the principal invasions. It was introduced into Denmark in 1841, and into the United States of America from Canada, where it had been carried by diseased cattle from England. It rapidly extended through cattle traffic from the State first invaded to adjoining States, but was extinguished and does not now appear to be prev-

alent on the American continent. It was twice introduced into Australia in 1872, but was stamped out on each occasion. Though not a fatal malady, and in the majority of cases readily amenable to treatment, yet it is a most serious scourge. It is transmissible to nearly all the domestic animals, even mankind sometimes becoming infected, but its ravages are most severe among cattle, sheep and pigs.

These are the best-known murrains affecting cattle; but there are others which, though they cannot be noticed here, are of some moment. One in particular demands most serious consideration, the disease known as "consumption," "pining," and (from the appearance of the morbid growths in the chest) "grapes," and to the medical and veterinary pathologist as "tuberculosis." It is a highly-infectious disorder in cattle, is becoming very common among the improved breeds, and causes heavy losses in dairy stock. It has been experimentally demonstrated that the tuberculous matter, as well as milk and the juice of the flesh of diseased cows, when given to healthy animals or inoculated in them, will produce the malady, and this leads to the grave question as to the danger incurred by mankind through the consumption of the flesh and milk of tuberculous cows. This is a pressing sanitary problem which demands early solution.

The legislative measures necessary for prevention or suppression of murrains are based upon the fact that these diseases depend for their extension solely upon their contagious properties. The object is, therefore, either to prevent the admission of the contagious principle, *i.e.*, through diseased animals or articles which have become infective by contact with them, or to destroy it as quickly as possible. The necessity for this is abundantly evident on every page in the history of scourges, and the governments of most civilized countries have taken the matter in hand and enacted regulations designed to prevent the importation of diseased cattle into their territory.

MURRAY COD. Of the numerous freshwater perches inhabiting the rivers and watercourses of Australia the Murray Cod (*Oligorus macquariensis*) is one of the largest, if not the largest, and the most celebrated on account of the excellent flavor of its flesh. In conferring upon the fishes of the new country familiar names, the early colonists were evidently guided by the fancied resemblance in taste or appearance to some fish of their northern home rather than by a consideration of their taxonomic affinities. These, as far as the Murray Cod is concerned, lie in the direction of the perch and not of the cod family. As implied by the name, this fish has its headquarters in the Murray river and its tributaries, but it occurs also in the northern part of New South Wales. It is the most important food fish of these rivers, and is said to attain to a length of more than three feet, and to a weight of 120 pounds.

MURRAY RIVER, the largest river in Australia, rises in the Australian Alps, and, flowing northwestward, skirts the borders of New South Wales and Victoria until it passes into South Australia, shortly after which it bends southward into Lake Alexandrina, a shallow lagoon, whence it makes its way to the sea at Encounter Bay by a narrow opening. Near its source, the Murray Gates, precipitous rocks, tower sheer above it to the height of 3,000 feet; and the earlier part of its course is very tortuous, broken and uneven. Farther on it in some parts loses so much by evaporation as to become merely a series of pools. Its length till it debouches into Lake Alexandrina is 1,120 miles, its average breadth in summer is 240 feet, its average depth about sixteen; and it drains an area of about 270,000 square miles. For small steamers it is navigable as far as Al-

bury. Periodically it overflows its banks, causing wide inundations.

MURRAY, or MORAY, JAMES STUART, SECOND EARL OF, regent of Scotland, was the illegitimate son of James V. by Margaret Erskine, daughter of the fourth Lord Erskine. Under the tutorship of George Buchanan his intellectual training was carefully attended to, and as early as his fifteenth year he gave evidence of rare courage and decision by an impetuous attack on an English force which had made a descent on the Fife coast, and which he routed with great slaughter. In addition to the priory of St. Andrews, he subsequently received those also of Pittenweem and of Mascon (France), but on reaching manhood he manifested no vocation for monasticism. The discourses of Knox, which he heard at Calder, won his high approval, and shortly after the return of the Reformer in 1559 Murray left the party of the queen-regent and joined the lords of the congregation, who resolved to adopt the bold measure of forcibly abolishing the Popish service. After the return of Queen Mary in 1561 he became her chief adviser, and his cautious firmness was for a time effectual in inducing her to adopt a policy of moderation and tolerance toward the Reformers. In 1562 he was created earl of Mar, and soon after married Lady Agnes Keith, daughter of the earl marischal. The earldom of Mar being claimed by Lord Erskine, he resigned the title and property and was created earl of Murray. After the defeat of Lord Huntly, leader of the Catholic party, who died soon afterward, the policy of Murray met for a time with no obstacle or hindrance, but he awakened the displeasure of the queen by his efforts in behalf of Knox when accused of high treason, and, as he was also strongly opposed to her marriage with Darnley, he was after that event declared an outlaw and compelled to take refuge in England. Returning after the death of Rizzio, he found the sentiments of the queen toward him very greatly altered, and received a full pardon. On the abdication of Queen Mary at Lochleven he was appointed regent. The position was full of temptation and difficulty, but his conspicuous integrity and moderation, joined to unflinching courage and the utmost readiness of resource, proved to be adequate to what the circumstances demanded. When Mary made her escape from Lochleven, he occupied her attention with pretended negotiations until he had gathered his adherents in sufficient force, when he completely defeated her at Langside (May 13, 1568) and compelled her to flee to England. Immediately afterward he frustrated an attempt at insurrection by the duke of Chatelherault, whom he confined in the castle of Edinburgh. The disappointed partisans of the queen resolved to have revenge, and one of their number, Hamilton of Bothwellhaugh, shot him through the body at Linlithgow, January 21, 1570. The wound proved fatal, and he died the same evening.

MURRAY, JOHN, M.D., lecturer on chemistry and materia medica, was born in Edinburgh in 1778 and died in 1820.

MURRAY, SIR ROBERT, one of the founders of the Royal Society, was the son of Sir Robert Murray, of Craigie, Ayrshire, Scotland, and was born about the beginning of the seventeenth century. In early life he served for some years in the French army, and rose to the rank of colonel. On the outbreak of the civil war he returned to Scotland, and was energetic in collecting recruits for the royal cause. The triumph of Cromwell compelled him for a time to return to France, but he took an active part in the Scottish insurrection in favor of Charles II. in 1650, and was named lord justice clerk and a privy councilor. Soon after this event Sir Robert Murray began to take a prominent part in the

deliberations of a club instituted in London for the discussion of natural science, or, as it was then called, the "new philosophy." When it was proposed to obtain a charter for the society, he undertook to interest the king in the matter, the result being that on July 15, 1662, the club was incorporated by charter under the designation of the Royal Society. Sir Robert Murray was its first president, and during the remainder of his life exerted himself with great zeal and ability to extend its influence. He died in June, 1673.

MURREE, or MARRI, a sanitarium and hill station in the Ráwal Pindi district, Punjab.

MURSHIDÁBÁD, or MOORSLEDABAD, a district in the lieutenant-governorship of Bengal. The area is 2,141 square miles. The district is divided into two nearly equal portions by the Bhágirathi, the ancient channel of the Ganges, which flows due north and south. The tract to the west, known as the Rárh, consists of hard clay and nodular limestone. The general level is high, but interspersed with *bils* or broad marshes, and seamed by hill torrents. The Bágri or eastern half differs in no respect from the ordinary alluvial plains of eastern Bengal.

The census of 1888 returned the population of the district at 1,626,790. The six following towns contained in 1888 a population exceeding 5,000: Murshidábád, 46,182; Barhampur, 27,210; Kandi, 12,016; Jangipur, 11,361; Beldanga, 6,037; and Margráam, 5,766.

MURSHIDABAD, principal city of the above district, is situated on the left bank of the Bhágirathi river. Its importance has entirely departed since it ceased to be the capital of Bengal, and its population has steadily diminished. In 1888 the population was 46,182 (Hindus 27,211, Mohammedans 18,824, Christians 38, "others" 109). It is still a great center of trade and manufacture, and the Jain merchants of Murshidábád rank as the wealthiest of their class in Bengal.

MURZUK. See FEZZAN.

MUS, the name of a family of the plebeian gens of the Decii. Two members of the family, a father and a son, crowned distinguished careers in the service of Rome by a singular act of self-devotion.

MUSÆUS is the name of three Greek poets. The first is an almost fabulous personage, who is said to have flourished in Attica, and to have been buried on the Museum Hill in Athens. The second Musæus was an Ephesian who was attached to the court of the Pergamene kings. The third is of uncertain date, but probably belongs to the fifth century A.D., as the structure of his hexameters is evidently modeled after the canons of Nonnus. The poem in 340 lines which he wrote on the story of Hero and Leander is by far the most beautiful Greek poem of the age.

MUSÄUS, J. K. A., a German author. He studied theology at Jena, his birthplace, and would have become the pastor of a parish but for the resistance of some peasants, who objected that he had been known to dance. In 1760 to 1762 he published in three volumes his first work, *Grandison der Zweite*, afterward (in 1871-72) rewritten and issued with a new title, *Der deutsche Grandison*. The object of this book was to show the comic aspects of Richardson's hero, who had many sentimental admirers in Germany. In 1763 Musäus was made tutor of the court pages at Weimar, and in 1770 he became a professor at the Weimar gymnasium. His second book—*Physiognomische Reisen*—did not appear until 1778-79. It was directed against Lavater, and attracted much favorable attention. In 1782-86 he published his most famous work, *Volksmärchen der Deutschen*. Born 1735, died 1787.

MUSCAT, or more correctly MASKAT, the chief

town of 'Omán in Arabia, lies upon the seacoast, at the extremity of a small cove in the gorges of a great pass leading inland through dark mountain walls, scorched with the sun and utterly without vegetation, which rise almost right out of the sea to a height of from 300 to 500 feet on both sides of the cove.

Around the cape which forms the northwest limit of the cove lies the prosperous and well-built town of Matrah, with 20,000 to 25,000 inhabitants, and a considerable production of 'Omán stuffs. It may be regarded as a suburb of Muscat, though the land road over the cape is so rough that communication between the towns is conducted chiefly by boats.

MUSCATINE, the capital of Muscatine county, Iowa, has a population of 11,454, and is an important shipping and manufacturing point. It is finely situated on the Mississippi river, at the junction of several railroads, and contains packing-houses, plow and furniture factories, national banks, newspaper offices, and many churches and schools.

MUSCINEÆ. The Muscineæ are a highly interesting class of plants on account of the important part they play in the economy of nature, and also from the remarkable conditions of their development and formation. In many parts of the world it is principally the mossy covering of forests which, by collecting the rainfall like a sponge, prevents the pouring down from mountains of violent and excessive torrents of water, while the Bog-moss (*Sphagnum*) plays an important part in the formation of peat; and many other Mosses which grow on rocks produce by the decay of their dead parts a thin layer of mold (humus) in which the seeds of higher plants are able to take root. The importance, however, of Mosses in a morphological point of view proceeds from their position in the botanical system. The Muscineæ immediately follow the first division of the vegetable kingdom, the Thallophytes, under which are included the Algæ and Fungi, because their vegetative body is a "thallus"—that is to say, is not divided into stem and leaf like that of higher plants, nor are they possessed of roots like those observed in higher plants, (Ferns, Conifers, Monocotyledons, Dicotyledons, etc.) Their anatomical structure is also very simple, the individual essential tissue-elements being but little differentiated from each other.

MUSES, THE, according to the view which prevailed among the Greek writers and has become a commonplace of modern literature, were nine goddesses who presided over the nine principal departments of letters; Calliope, Muse of epic poetry; Euterpe, of lyric poetry; Erato, of erotic poetry; Melpomene, of tragedy; Thalia, of comedy; Polyhymnia, of the hymn as used in the worship of the gods; Terpsichore, of choral song and the dance which formed its necessary accompaniment; Clio, of history; and Urania, of astronomy. They are represented in ancient art as fully draped figures characterized by attitude, dress, and symbols appropriate to the departments over which they presided. In the simpler conception that prevails in earlier literature they were said to be daughters of Zeus and Mnemosyne, *i.e.*, memory personified. In chorus around the altar of Zeus they sing the origin of the world, of gods, and of men, the might and the glorious deeds of Zeus. At the banquets of the gods their joyous music is heard. They honor also the great heroes; they sing at the marriage of Cadmus and of Peleus; their mourning song at the death of Achilles drew tears from both gods and men. They know all things past and future and impart to their chosen poets the knowledge and the skill to write. They are usually maiden goddesses, but some of the mythic poets—Orpheus, Linus, Ialemus—are said to be sons of a Muse.

This conception of the number and character of the Muses is as old as Hesiod and the *Odyssey* (xxiv. 60), yet it is far removed from the genuine religious stratum out of which the poets fashioned it. The religion of the Muses had two chief seats, on the northern slope of Mount Olympus around Dion in Pieria, by the holy springs Leibethron and Pimpleia; and on the slope of Mount Helicon near Ascrea and Thespiæ. Nothing is known of the cultus in its older form, but it appears to have been connected with the religion of Dionysus. The Muses must have been originally a variety of the Nymphs (see NYMPHS), the spirits of nature who live in the fountains and forests; hence they are associated with Pegasus, the winged horse of the thunder-cloud.

MUSHROOM. There are few more useful, more easily recognized, or more delicious members of the vegetable kingdom than the common mushroom, (*Agaricus campestris*, L.) It grows in short grass in the temperate regions of all parts of the world. Many edible Fungi depend upon minute and often obscure botanical characteristics for their determination, and may readily be confounded with worthless or poisonous species, but that is not the case with the Common Mushroom, for, although several other species of *Agaricus* somewhat closely approach it in form and color, yet the true mushroom, if sound and freshly gathered, may be distinguished from all other Fungi with great ease. It almost invariably grows in rich, open, breezy pastures, in places where the grass is kept short by the grazing of horses, herds, and flocks. Although this plant is popularly termed the "meadow mushroom," it never as a rule grows in meadows. It never grows in wet, boggy places, never in woods or on or about stumps of trees. An exceptional specimen or an uncommon variety may sometimes be seen in the above-mentioned abnormal places, but the best, the true, and common variety of our tables is the produce of short, upland, wind-swept pastures. A true mushroom is never large in size; its cap very seldom exceeds four, at most five, inches in diameter. The large examples measuring from six to nine or more inches across the cap belong to *Agaricus arvensis* (Sch.), called from its large size and coarse texture the Horse Mushroom, which grows in meadows and damp shady places, and though generally wholesome is coarse and sometimes indigestible. The mushroom usually grown in gardens or hotbeds, in cellars, sheds, etc., is a distinct variety, known as *Agaricus hortensis*, (Cke.) This is a compact and inferior form of the true mushroom, or it may indeed be a hybrid or even a distinct species.

The parts of a mushroom consist chiefly of stem and cap; the stem is furnished with a clothy ring around its middle, and the cap is furnished underneath with numerous radiating colored gills. When a mushroom is perfectly ripe and the gills are brown-black in color, they throw down a thick dusty deposit of fine brown-black or purple-black spores; it is essential to note the color. The spores on germination make a white felted mat, more or less dense, of mycelium; this, when compacted with dry, half-decomposed dung, is the mushroom spawn of gardeners. The stem is firm, slightly pithy up the middle, but never hollow; it is furnished with a floccose ring near its middle; this ring originates by the rupture of the thin general wrapper of the infant plant. On being cut or broken the flesh of a true mushroom remains white or nearly so, the flesh of the coarser Horse Mushroom changes to buff or sometimes to dark brown. To summarize the characteristics of a true mushroom—it grows only in pastures; it is of small size, dry, and with unchangeable flesh; the cap has a frill; the gills are free from the stem, the spores brown-black or deep purple-black in color, and the stem solid or slightly pithy.

When all these characters are taken together no other mushroom-like fungus can be confounded with it.

MUSIC is the art which employs sounds as a medium of artistic expression for what is not in the province of literature, of sculpture, of painting, of acting, or of architecture. The indefiniteness of musical expression furnishes no argument that music is inexpressive, but is one of the qualities that place it on the highest level of art-excellence, enabling it to suggest still more than it displays, and to stimulate the imagination of the witness as much as to exercise that of the artist. The musician is then a poet, whether we regard the term in its primary sense of "maker," the exact translation of the Greek word by which versifiers were styled in early English, or in its applied sense of one who expresses thought and feeling through the medium of highly-excited imagination. Music, then, is that one of the fine arts which appropriates the phenomena of sound to the purposes of poetry, and has a province of its own in many respects analogous to, but yet wholly distinct from, that of each of the other arts. It is common to style it "the universal language;" but the definition is untrue, for in every age and in every clime there are varieties of musical idiom which are unsympathetic, if not unintelligible, to other generations than those among whom they are first current, and, still more, the very principles that govern it have been and are so variously developed in different times and places that music which is delightful at one period or to one people is repugnant at another epoch or to a different community.

To define the special science, and the art which is its application, that is denoted by our word *music*, the Greek language has two other words, *harmonia* or *harmonike* and *melodia*—*harmonia* implying the idea of "fitting," and so being a term for propriety or general unity of parts in a whole, not in our limited technical sense of *combined sounds*, but with reference to the whole principle of orderly and not specially tonal regulation, *melodia* implying the rising and falling of the voice in speech, and being applied only at a subsequent epoch to a *succession of musical notes*.

We thus owe our three chief musical terms to the Greeks, and in our prevailing system much more besides; they themselves, however, owed all to earlier sources, for the essentials of their knowledge and practice are traced to Egypt.

Instruments of percussion are supposed to be the oldest, wind instruments the next in order of time and of civilization, and string instruments the latest invention of every separate race. The clapping of hands and stamping of feet, let us say, in marking rhythm exemplify the first element of music, and the large family of drums and cymbals and bells is a development of the same principle. Untutored ears are quicker to perceive rhythmical accentuation than variations of pitch, so the organ of time makes earlier manifestation than the organ of tune, though, musical sound being a periodic succession of vibrations, the operation of the latter is truly but a refinement on that of the former. The sighing of wind, eminently when passing over a bed of reeds, is Nature's suggestion of instruments of breath; hence have been reached the four methods of producing sound through pipes—by blowing at the end, as in the case of the English flute and the flageolet; at the side, as in that of the ordinary concert flute; through a double reed, as in that of the hautboy or oboe and bassoon; and over a single reed, as in that of the clarinet—all of which date from oldest existing records; and also upon the collection of multitudinous pipes in that colossal wind instrument, the organ. An Egyptian fable ascribes the invention of the lyre to the god Thoth; a different Greek fable gives the same credit

to the god Hermes; and both refer it, though under different circumstances, to the straining of the sinews of the tortoise across its shell—whence it can only be inferred that the origin of the highest advanced class of musical instruments is unknown. This class includes the lyre and the harp, which give but one note from each stretched string; the lute, which, having a neck or finger-board, admits of the production of several notes from each string by stopping it at different lengths with the fingers; the viol, the addition of the bow to which gives capability of sustaining the tone; and the dulcimer, finally matured into the pianoforte, wherein the extremes of instrumental fabrication meet, since this is at once a string instrument and an instrument of percussion, having the hammer of the drum to strike the string of the lyre.

The classic Greeks used music in rhapsodizing or chanting with vocal inflections the epic poems; they employed it in religious rites and to accompany military evolutions; and prizes were awarded for its performance by voices and on instruments (including, during the last two centuries B.C., the organ) at their Olympic and other games. It belonged essentially to the drama, which had its origin in the dithyrambic hymns; these were gradually developed into the tragedy, which took its name from the *tragos* (goat) that was sacrificed to Dionysus during the performance. Possibly Thespis (536 B.C.) may have spoken the recitations with which he was the first to intersperse the hymns; but some interpreters of Greek writings affirm, and others while doubting do not disprove, that in the mature drama all the characters sang or chanted, seemingly after the manner of the rhapsodists, and the impersonal chorus sang to instrumental accompaniment during their orchestric evolutions, from which motions or marchings the part of the theater wherein the chorus were stationed between the audience and the proscenium was called the orchestra. Here, then, was the prototype of the modern opera, the main departure from which is the transplanting of the chorus to the stage and giving to its members participation in the action. Æschylus wrote the music to his own tragedies; Sophocles accompanied on the cithara the performance of his *Thamyris*, if not of other of his plays; Euripides left the composition of the music for his works to another genius than his own, and such was the case with after dramatists.

In ancient Rome the choristers in tragedies were very numerous, including female as well as male singers; they were accompanied by a large number of instruments, among which trumpets were conspicuous. How or when the musical system of the Greeks fell into disuse is still untraced; certainly it prevailed and engaged the attention of philosophers for some centuries of the Christian era.

The system of notation by letters of the Greek alphabet had fallen into disuse. A system by neumes or pneumata, of later date than St. Gregory, employed signs over or under the syllables to indicate the rising or falling of the voice but not to define its extent, and, in the manner of modern punctuation, to show where breath should be taken. This was followed by, though for a time practiced coincidentally with, one in which the Roman letters stood for notes. Afterward, something like our staff was employed, of which the spaces only and not the lines were used, the syllables being placed in the higher or lower of them to denote to what extent the melody should rise or fall. Of earlier date than anything that has been found of like advance in other countries is a service-book which belonged to Winchester cathedral, and contains music written on the lines as well as in the spaces of a staff of four lines; and this comprises a prayer for Ethelred II., who died in 1016.

One of the most inscrutable things to the modern student is the lateness at which notation was devised for defining the relative length of musical sounds. The rhythmical sense is the earliest of the musical faculties to be developed, and is often the strongest in its development among individuals and nations. Still, the ancients have left no record that they had signs of indication for the length of notes, and centuries rolled over Christendom before there was any chronicled attempt to find a principle for supplying this musical necessity. Here again conjecture will insist that the practice of singing longer and shorter notes with stronger and weaker accent must have prevailed before a system was framed for its regulation; and in this supposition offers that the instincts of the people must have given example for the canons of the schoolmen. Franco of Cologne, in the twelfth century, is the first writer who codified the uses of "measured music," and all he enunciates is expanded in the treatises of Walter Odington, a monk of Evesham, who was appointed archbishop of Canterbury in 1228. At this period and afterward, bar-lines were drawn across the whole or a portion of the staff to show the end of a musical phrase in accordance with that of the line or verse which was to be sung to it, and the number of notes between these bar-lines was more or less, according to the number of syllables in the verse. It was not, however, till more than three hundred years later that music was first divided into bars of equal length, and not until a still later date that these were applied to their most valuable purpose of showing the points of strongest emphasis.

The advance of music was earlier and greater in England than elsewhere. In the fifteenth century Flanders produced the musicians of most esteem and greatest influence. Early among these was Ockenheim or Ockeghem of Hainault (c. 1420-1513), who was surpassed in fame by his pupil Josse Desprès (more commonly known by what must have been his pet name of Josquin) of Hainault. He practiced the art in his own country, in Italy, in France, and in Austria, and was everywhere regarded as its highest ornament. In the fifteenth century and later, because musical erudition was still applied entirely to the service of the church, and because Italy was the ecclesiastical center, musicians of all lands went to Italy, and especially to Rome. It was, however, in England first, and it has been only in England until America adopted the practice, that academical honors have been given to musicians. John Hamboys (c. 1470), author of some treatises on the art, is the reputed first doctor of music. The knightly calling, in the age of chivalry, not only referred to heroic acts and deeds of arms, but regarded skill in verse and melody, in singing and accompaniment. Princes and nobles of highest rank practiced these arts, and were then styled troubadours, who were sometimes attended and assisted by jongleurs to play to their singing. (See TROUBADOURS.) A similar race of knightly songsters in Germany were the minnesänger. They set great value on the invention of new meters, and he who produced one with a melody to suit it was called a *meister* (master), while he who cast his verses in a previously accepted meter or adapted them to a known melody was styled *tondieb* (tone thief). One of the most meritorious and by far the most prolific of the whole craft—his compositions being numbered by thousands—was Hans Sachs, of Nuremberg (1494-1576). He was by trade a shoemaker, and all the members of the guild followed some such calling, and devoted themselves to the study and practice of song as recreation from their daily labor.

The dawn of the sixteenth century is marked by the

appropriation of musical scholarship to secular writing. It was about that time that the *madrigal* came into vogue. The etymology of the word is obscure, but the class of music to which it is applied is clearly distinguished.

The renowned Roman school, to which we must now pass, owed its existence to the precept as much as to the example of foreigners, chiefly from Flanders. Claude Goudimel (c. 1510-1572), known as Fleming, though his birth is assigned to Avignon, was the first to open a seminary for musical tuition in Rome, and the most famous musicians of the century were its pupils—Palestrina (ob. 1594), Orlando di Lasso (ob. 1594), the brothers Animuccia, the brothers Nanini, and many more.

Though the church from time to time appropriated the secular art-forms from their rise to their maturity, its chief authorities were always jealous of these advances, and issued edicts against them. So in 1322 Pope John XXII. denounced the encroachments of counterpoint, alleging that the voluptuous harmony of the 3ds and 6ths was fit but for profane uses.

It was in the middle of the sixteenth century that the class of composition now ranked as the highest was originated. The *oratorio* dates its existence and its name from the meetings held by San Filippo Neri in the oratory of his church in Rome, at first in 1556, for religious exercise and pious edification. Originally this consisted of *laudi* or short hymns, the extent of which was afterward enlarged; by and by the spoken matter was replaced by singing, and ultimately the class of work took the form in which it is cast by present composers. Such is the source of the didactic oratorio; the dramatic oratorio is an offshoot of the same, but is distinguished by its representation of personal characters and their involvement in a course of action.

Yet another prominent feature in musical history dates from the beginning of the sixteenth century, the practice of hymnody. (See HYMNS.) Luther is said to have been the first to write metrical verses on sacred subjects in the language of the people, and his verses were adapted sometimes to ancient church melodies, sometimes to tunes of secular songs, and sometimes had music composed for them by himself and others. In conjunction with his friend Walther, Luther issued a collection of poems for choral singing in 1524, which was followed by many others in North Germany. The English practice of hymn-singing was much strengthened on the return of the exiled Reformers from Frankfurt and Geneva, when it became so general that, according to Bishop Jewell, thousands of the populace who assembled at Paul's Cross to hear the preaching would join in the singing of psalms before and after the sermon.

The placing of the choral song of the church within the lips of the people had great religious and moral influence; it has had also its great effect upon art, shown in the production of the North German musicians ever since the first days of the Reformation, which abound in exercises of scholarship and imagination wrought upon the tunes of established acceptance.

Opera was first introduced in France by Cardinal Mazarin, who imported a company of Italian performers for an occasion. The first French opera, *Akebar, Roi de Mogul* (1646), was composed by the abbé Mailly for court performance. So was *La Pastorale* (1659), by Cambert, who built his work on the Florentine model, and, encouraged by success, wrote several others, on the strength of which he, with his librettist Perrin, instituted the Académie Royale de Musique, and obtained a patent for the same in 1669, exclusively permitting the public performance of opera.

The ballet has been a favorite subject of court diversion since Beaujoyeaulx produced, in 1581, *Le Ballet Comique de la Royne*, a medley of dancing, choral singing, and musical dialogue.

In Germany the seed of opera fell upon stony ground. Heinrich Schütz wrote music to a translation of Peri's *Dafne*, which was performed for a court wedding at Torgau in 1627; but only importations of Italian works with Italian singers came before the public until nearly the end of the century.

In England the lyrical drama found an early home. The masques performed at Whitehall and at the Inns of Court were of the nature of opera, and were largely infused with recitative. Eminent among others in their composition were Nicholas Lanier (c. 1588-1664), born of an Italian father who settled in England in 1571; Giovanni Coperario, who during his sojourn in Rome had thus translated his patronymic of John Cooper; Robert Johnson, who wrote the original music for *The Tempest*; Doctor Campion, Ives, and William and Henry Lawes. The name of Henry Purcell (1658-1695) figures brightly in this class of composition; but, except his *Dido and Eneas*, written when he was eighteen, his so-called operas are more properly spoken dramas interspersed with music—music of highly dramatic character, but episodic rather than elemental in the design.

The music of the English Church might demand a separate history, because of its importance by the side of the art of other lands, because of the longer permanence of its examples than of works in other branches, and because of its unbroken succession of contributors, covering a period of beyond three centuries, whose style has varied with the age in which they wrought, but who in this department have ever aimed to express themselves at their highest. Here, however, only the names of the most noted writers, with an approximation to chronological order, can be given—Tallis, Byrde, Farrant, Orlando Gibbons, Doctor Child, Doctor Benjamin Rogers, Dean Aldrich (as distinguished in logic and in architecture as in music), Doctor Blow, Michael Wise, Pelham Humphrey, Henry Purcell, Doctor Croft, Doctor Greene, Doctor Boyce, Doctor Nares, Doctor Cooke, Battishill, after whom the art sank in character till it received new life from the infusion of the modern element by Attwood, coeval with whom was Samuel Wesley, and lastly to be noted are Sir John Goss, Doctor S. S. Wesley, Doctor Dykes (popular for his hymn-tunes), and Henry Smart, who bring the list down to recent personal remembrance. Well esteemed among living representatives of this department of music are Barnby, J. B. Calkin, Sir G. J. Elvey, Gadsby, Doctor Garrett, Doctor Gladstone, Doctor H. Miles, Doctor Hopkins, Doctor E. G. Monk, Doctor W. H. Monk, Sir F. A. G. Ouseley, Doctor Stainer, Doctor Steggall, Sir Arthur Sullivan, and E. H. Turpin, to which names many might be added.

Attention must now be directed to the natural as opposed to the artificial basis of music. Marin Mersenne had great love and much practical knowledge of music; he directed his profound learning and rare mathematical attainments to the investigation of the phenomena of sound; and his treatise, *Harmonie Universelle* (1636), first enunciated the fact that a string yields other notes than that to which its entire length is tuned. The discovery was extended by William Noble and Thomas Pigot, respectively of Merton and Wadham Colleges, Oxford, to the perception of the mode in which a string vibrates in sections, each section sounding a different note. The ancient musicians tested by calculation the few phenomena of sound then discovered rather than by observation of the principles these ex-

emplify. The measurement of major and minor tones was, after the distinction of perfect intervals, the subject dearest to their consideration, and it seems the furthest limit to which their knowledge attained. All the laws for melody, all the rules for counterpoint, were founded on this mathematical method.

Scientific discovery has seldom been made singly. When time has been ripe for the revelation of a phenomenon, several observers have coincidentally witnessed its existence, and simultaneously, or nearly, so displayed if not explained it to the world. In the instance under consideration, art foreran science, and its votaries continued the employment of harmonies which as yet could alone be justified by their beautiful effect, and even musical theorists did not for ages to come perceive the important, the all-powerful bearing of the principle of harmonics upon the subject they treated. What Mouton first ventured to write must be styled the starting-point of the modern in music, and one cannot too much marvel at the strong insight into the beautiful which those after-minds possessed—that, with no theory to guide, without star or compass, they made wider and wider application of the principle he had exemplified, and displayed in their works its utmost power of expansion. Three of the world's greatest musicians may be cited to show the force owned by genius of piercing to the utmost depth of a natural law, while having but their own delicate sense of propriety to restrain them within its bounds. Henry Purcell and his two colossal successors, George Frederic Handel (1685-1759) and Johann Sebastian Bach (1685-1750), wrote every combination of musical notes that down to our own latest times has ever been employed with good effect; and the more the works of these masters are studied the more are they found to foreshadow the supposed novelties in harmony employed by subsequent artists. This refers but to the technical materials of which their music is wrought; it is impossible in the present article to discuss fully the form and excellence of their works.

Handel's music has never, since he wrote, been wholly unknown or unloved, at least in England. He was engaged as a dramatic composer because of his Continental renown; this was immensely increased by the large number of Italian operas he wrote for the London stage, but, excellent of their kind as are these, the change of structure in the modern lyrical drama unfits the wonted witnesses of the works of the last hundred years to enjoy the complete performance of those of earlier time, and hence we hear but detached excerpts from any of them. It is upon Handel's oratorios and his secular works cast in the same mold that general knowledge of his mighty power rests, and these are a monument that cannot perish.

Bach was one of a very large family of musicians, who for two centuries practiced the art, in many instances with great success; the family glory culminated in him, and was scattered among his many sons, in whom it became extinct. Bach was a more assiduous student than either his predecessor or his contemporary who are here classed with him. It was later in life than they that he issued his earliest works, for his youthful renown was more as a player than as a producer. Having no theoretical instructor, he made searching study of all the music of earlier times and of his own.

The pianoforte may be styled the voice of the musician, the only means whereby unaided he can give complete utterance to his thoughts, the only vehicle for the communication of musical ideas in their entirety. This is not said in depreciation of other instruments of various excellence which have qualities impossible to the pianoforte, but has reference to the totality of musical speech that is possible, and to the convenience

with which this is produced on the instrument in question. The characteristic difference between this instrument and earlier ones of a similar class is that the strings of the pianoforte are struck by hammers impelled by the keys under the performer's finger, and yield louder or softer notes according to the force he uses, whereas its predecessors yielded variety of loudness only by mechanical instead of personal means, and hence were not the living exponents as it is of the executant's impulse. The term "pian e forte" is applied to a musical instrument by Paliarino or Paggiarini, a manufacturer of Modena, in 1598, but no particulars have reached us of its structure or effect. Some instruments which foreshadow the chief essentials of the modern pianoforte, made by Bartolomeo Cristofori, a Paduan then working in Florence, are described in letters of 1709, and must have been made some years earlier, and pianofortes by this ingenious inventor still exist bearing date 1720 and 1726. Marius, a Frenchman, submitted plans for an instrument with hammer action to the Académie Royale des Sciences in 1716, and Schröter, a German, claimed to have devised two models in 1717 and 1721; but the first pianofortes made away from Italy were by Gottfried Silberman in 1726, who worked from the designs of Cristofori.

Let us now revert to the opera, in which vast modifications were germinated toward the middle of the eighteenth century, and ripened before its close into noble maturity. At first wholly unregarded as a sphere for art uses, then admitted for interludial purposes in a fabrication styled *intermezzo* that was played between the acts of a serious composition, comedy became in course of time the basis of the most highly important, because the most comprehensive and truly the grandest, and further because the most especially musical, application of the art to dramatic ends. The class of writing here to be considered is that structure of concerted vocal music through which a continuous action proceeds, involving the embodiment of the characteristics of the several persons concerned, with their opposition and combination. Handel had been remarkably happy in uniting in one piece the utterances of three, four, and even five distinct persons; he did not, however, make these several individualities interchange speech in dialogue, but caused them to sing, as it were, so many monologues at once, each independent of the others, and Handel was not singular in his occasional practice though he was in his excellence. For some time this form of lyrical dramatic art was only applied to comic subjects; Paesello is said to have been the first musician who introduced its use into serious opera; it reached perfection under the masterly touch of Mozart, whose two finales in *Figaro* and two in *Don Giovanni* are models which should be the wonder of all time and yet can never be approached.

Christoph Willibald Gluck (1714-1787) was a Bohemian by birth and a wanderer by habit. He was a grand reformer, or rather restorer, of dramatico-musical art, for he not only revived the principles enunciated in Florence on the threshold of the seventeenth century, which had been superseded by the vocalisms that had usurped the throne of truth, but he fully forestalled by this revival all that is good in what is nowadays denoted by the cant term "music of the future." As was the wont of his age, Gluck went to extend his art experience, perhaps to complete his education, to Italy, and there produced so many meritorious works in the style of the time as to establish a high reputation. This led to his engagement to write for the Italian Opera in London, whither he came in 1746. The work he composed for this occasion and one he then reproduced met with small favor, and a "pasticcio" from his previous works, *Piramo e Tisbe*, had no better fortune. Gluck there-

fore resolved to abandon the prevailing customs in writing for the stage, and to devise a system of dramatic composition wherein the musical design should grow out of the action of the scene, being ever dependent upon and illustrative of it, and yet being always a design faithful to the principles of what may be named musical architecture.

The origin, development, and supreme importance of the *symphony* next claim our attention. The term is and always has been used in Italy to define the instrumental preface, which elsewhere is called an overture, to a long vocal work. Handel and others, early in the eighteenth century, defined by it an instrumental piece incidental to such a work, generally depicting some supposed action, such as a battle, or a multitudinous entry. The term is also applied to the prelude and interludes in a single vocal piece of however small extent.

Haydn (1732-1809) is commonly styled the father of the symphony. If truly, then Carl Philip Emanuel Bach (1714-1788), the second of the many sons of the great Sebastian, stands as grandfather in the genealogy of that species of music; and its remoter ancestry may be traced to all but forgotten men in whose works is certainly a forecast of the plan above described. Haydn produced the marvelous number of 125 symphonies (some of them, indeed, were overtures for theatrical use), besides seventy-seven quartets for bowed instruments (the last one unfinished), fifty-two pianoforte sonatas, and pieces that are almost countless for various combinations of instruments; and in these one knows not whether to wonder more at the infinite fluency of melody or at the artistic mastery. In summing up the enormous amount of his works regard must also be given to his three oratorios, his fourteen masses, his operas, and his many detached pieces for one and several voices, and then it is hard to believe that all this can have been accomplished in a single life.

Next in chronology as a symphonist stands Mozart (1756-1791). Mozart wrote forty-eight symphonies, some of them in the tenderest years of childhood, and repeated the design in many chamber works for several or for a single instrument.

History now steps on to the great name of Beethoven (1770-1827), who in his nine symphonies, his six concertos (which are pieces on the same plan with the addition of a part for a solo instrument), and his priceless bequest of chamber music commands the world's adoration. It is the shallow practice of the present day to depreciate his two great predecessors, especially Mozart, in his favor; but comparative criticism is to ill purpose if it can only exalt one master by the dethronement of another. Beethoven enlarged the symphony, in some respects changed its character, and perhaps advanced its consideration; above all, after writing for awhile in the idiom of those two masters, he stamped his own individuality upon music. Let us delight in Beethoven—who can fail?—but let us also love Mozart and revere Haydn.

Next in time came Spohr (1784-1859), whose deliciously-phrased, rich-toned symphonies have lost regard in late years, but not beauty. Of his seven symphonies, four bear titles which refer them to an objective purpose; but they are still subjective, for the personality of the writer is expressed in every bar. Mendelssohn (1809-1847) did less but achieved more than Spohr; far less numerous, his instrumental writings for the concert-room and for the chamber have vitality and permanence which are not in those of the other master; they belong as much to hereafter as to now, while those of Spohr are already of the past. Schumann (1810-1856) has suffered through the persistence of his partisans in com-

paring him with another instead of displaying and extolling his own merit. Johannes Brahms is a worker in this class of art, who has planted his foot in the future and given warrant for transmitting to the coming generation the great model he received from the past, which, because of the masterpieces that have been cast in it, justly bears the name of classical. Cherubini (1760-1842) is the one Italian known to have written a symphony, and this work gives small reason for regret that it stands thus alone; he arranged the same as a violin quartet and wrote two original pieces of this class. Méhul (1763-1817) is the French representative of the symphonic art best known and best esteemed.

The Englishmen who have best succeeded in this highest form of music are Doctor Crotch (1775-1847), Cipriani Potter, J. Henry Griesbach (1798-1875), Henry Westrop (1812-1879), and Sterndale Bennett (1816-1875).

To have spoken of orchestral music compels notice of instrumentation as an element of the art that has high significance. It is analogous to coloring with the painter, being extra to the composition or plan of his work, but essential in vivifying and varying its effect. Its root is the appropriation of passages to the capabilities of instruments for which they are designed, and this is planted in the earliest as much as the latest essays in composition. Instrumentation may be styled the chemistry of sound, which by the synthesis of distinct tones produces new organisms; it is the blending of any of the rays of the musical prism which produces previously unheard colors. Mozart was the first to evince the very fine sense which perceives the parity and disparity of qualities, how some sounds will mix with and some will penetrate through others, how some instruments by pouring forth a stream of harmony may enrich or nourish a melody that floats on its surface in another quality of tone.

In two centuries instruments have undergone large modification, and their treatment has been modified accordingly. Writing for the harpsichord is widely different from that for the pianoforte, which also has been changed in character from generation to generation of composers, not only because of improvements in the manufacture of the instrument, but because of enlarged insight into its capabilities; hence the music of Emanuel Bach, Mozart, Dussek, Beethoven, Clementi, Cramer, Hummel, Moscheles, John Field, C. M. von Weber, Mendelssohn, Chopin, Schumann, Liszt, Thalberg, Sterndale Bennett, and Anton Rubenstein forms a continuous scale of development in aptitude and diversity. The transformation of the viol of various sizes into the violin, violoncello, and double bass of present use is a subject for special history, but its course is inseparably associated with the names of the great Cremonese manufacturers, Andrea Amati (1540), his two sons, and his grandson, the family Guanarius, and Straduaris, who all practiced their craft as an art more than as a trade, setting each the stamp of his own genius on the instruments he produced and leaving models that have never yet been equaled. The extended resources of bowed instruments have come wholly through extended skill of executants, especially of Viotti, Rudolph, Kreutzer, Rode, Baillot, Paganini, Spohr, De Beriot, Molique, Ernst, Blagrove, Sivori, Sainton, Vieuxtemps, Joachim, and Carrodus on the violin; of Crosdill, Cervetto, Lindley, and Piatti on the violoncello; and of Dragonetti and Bottesini on the double bass. The entire construction of flutes and reed instruments was changed by Theobald Boehm (1794-1881), and all makers now work upon his principle. Facilities have been increased on each of these classes of instruments, but on horns and trumpets modern use has in some respects diminished

them; that is, employing only notes of the harmonic scale, players of the time of Purcell, Handel, and Bach practiced so constantly in the upper register that they easily produced the twelfth harmonic and above this sometimes notes up to the eighteenth, and these they executed with volubility akin to that displayed on fingered instruments; it is now the custom to exercise the lips on the lower notes and on longer continued sounds, and hence the passages written by the elder masters are difficult to the verge of the impossible to present practitioners, and a totally different character distinguishes modern from earlier music for brass instruments. On the other hand, Charles Joseph Sax (1791-1865), and far more his son Adolph, have devised such systematic changes in the fabrication of all brass instruments as to give them an entirely new place in the orchestral category; by means of the pistons, of the sax-horns, cornets, and the like, these instruments yield the complete chromatic scale, which, superficially, appears to be an advantage; but, save for military bands, the alteration is a serious evil and has an incalculably pernicious effect upon the orchestration of the day.

A class of opera, defined in French as *opéra comique*, dates ostensibly from 1715. The definition is unsound, because, whatever the subjects of the first pieces so styled, it is often applied to works of a romantic, serious, or even tragic nature. The separation of this from the grand opera lies in the latter having music throughout, its rhythmical pieces being divided by accompanied recitative, while the *opéra comique* consists of music interspersed with spoken dialogue.

A new species of composition has sprung into being within these thirty years, which in France is defined as *opéra bouffe*, and in England as *comic opera*, but is totally distinct from the *opera buffa* of Italy or the *opéra comique* of France, while less unlike the *intermezzo* of Italian use in the eighteenth century. It may be described as burlesque, sometimes of stories that have held mankind's respect for ages, sometimes of modern social absurdities, but having the ridiculous for its main quality, and extravagant in every essential. It consists of an intermixture of lightest and most frivolous music with spoken dialogue, and depends as much on its literary sprightliness as on its musical tunefulness, for success. It may be said to have been originated by Offenbach (1819-1882) of Cologne, who settled in Paris when young, where in 1855 he engaged a theater for the production of his lyrical caricatures, initiated them with *Les Deux Aveugles*, and wrote in all sixty-nine pieces. He has several imitators in the country of his adoption, and is represented in England by Sir Arthur Sullivan.

During the last thirty years Richard Wagner (1813-1883) has striven to revolutionize the lyrical drama by his polemical writing, by his compositions for the theater, of which he is the twofold author of words and notes, and by his extraordinary means of bringing these conspicuously before the public. His principles were all gathered from antecedent reformers; their application was his own. His works of art are, by himself and his supporters, professed to be neither dramas nor music, but this cannot exempt them from dramatic and musical censure. The very remarkable commotion he has made in the world of art might be compared with that excited by the rivalry between Buononcini and Handel in London and that between Piccini and Gluck in Paris, but that these were in each instance the contention between one musician and another, whereas in the present case it is the opposition of one writer to all the musicians in the world, save the few members of the profession who, believing in the man, his doctrine, and his power to apply it, under-

take propagandism as a duty, and endeavor to make proselytes to their faith. Wagner's recent death has left judgment free as to his theoretical and practical merit; and a few years will determine the permanence or evanescence of his productions.

MUSIC-BOX, an instrument for producing by mechanical means tunes or pieces of music. The modern music-box is an elaboration of the elegant toy musical snuff-box in vogue during the eighteenth century. The notes or musical sounds are produced by the vibration of steel teeth, or springs cut in a comb or flat plate of steel. The teeth are graduated in length from end to end of the comb or plate, the longer teeth giving the deeper notes; and, where necessary, by filling or loading with lead the individual teeth are accurately attuned. Each tone and semitone in the scale is represented by three or four separate teeth in the comb, to permit of successive repetitions of the same note when required by the music. The teeth are acted upon and musical vibrations produced by the revolution of a brass cylinder studded with projecting pins, which, as they move around, raise and release the proper teeth at due intervals according to the nature of the music. An entire revolution of the cylinder completes the performance of the special pieces of music for which the apparatus is set, but upon the same cylinder there may be inserted pins for performing as many as thirty-six separate airs. This is accomplished by making both the points of the teeth or springs and the projecting pins which touch them very fine, so that a very small change in the position of the cylinder is sufficient to bring an entirely distinct set of pins in contact with the note teeth. In the more elaborate music-boxes the cylinders are removable, and may be replaced by others containing distinct sets of music. In these also there are combinations of bell, drum, cymbal, and triangle effects, etc. The revolving motion of the cylinder is effected by a spring and clock-work, and the rate of revolution is regulated by a fly regulator. The headquarters of the music-box trade is Geneva, where the manufacture gives employment to upward of 1,000 persons.

The music-box is a type of numerous instruments for producing music effects by mechanical means, in all of which a revolving cylinder or barrel studded with pins is the governing feature. The principle of the barrel operating by percussion or by wind on reeds, pipes, or strings governs carillons or music bells, barrel organs, mechanical flutes, celestial voices, harmoniphones, and the sometimes huge and complex orchestrons in which a combination of all orchestral effects is attempted. A principle of more recent introduction than the studded cylinder consists of sheets of perforated paper or card, somewhat similar to the Jacquard apparatus for weaving. The perforations correspond in position and length to the pitch and duration of the note they represent, and as the web or long sheet of paper passes over the instrument, the perforated holes are brought in proper position and sequence under the influence of the suction or pressure of air from a bellows, and thereby the notes are either directly acted on, as in the case of reed instruments, or the opening and closing of valves set in motion levers or liberate springs which govern special notes. The United States is the original home of the instruments controlled by perforated paper known as organettes, organinas, melodeons, etc.

MUSK, a substance of powerful and most enduring odor, is a secretion of the MUSK DEER, (*q.v.*) Three kinds of musk are distinguished in commerce, the most important and valuable being the Chinese or Tong-king musk, imported principally from Shanghai. It is put up in small, tin-lined, silk covered caddies, each contain-

ing from two to three dozen pods. These are generally adulterated to an enormous extent with dried blood, fragments of leather, leaden pellets, peas, etc., so that often little more than the smell of the original tenant of the pod remains.

Good musk is of a dark purplish color, dry, smooth, and unctuous to the touch and bitter in taste. It dissolves in boiling water to the extent of about one-half, alcohol takes up one-third of the substance, and ether and chloroform dissolve still less. A grain of musk will distinctly scent millions of cubic feet of air without any appreciable loss of weight, and its scent is not only more penetrating but more persistent than that of any other known substance.

MUSK-DEER, an animal belonging to the genus *Moschus*, of the section *Pecora*, a division of the *Artiodactyle Ungulates*, and allied to the Deer (*Cervidae*). In many respects it differs from the typical members of that group and stands by itself as an isolated zoological form, retaining characters belonging to the older and more generalized types of ruminants before they were distinctly separated into the horned and the antlered sections now dominant upon the earth. One of these characteristics is that both sexes are entirely devoid of any sort of frontal appendage.

Although, owing to variations of color presented by different individuals in different localities and seasons, several nominal species have been described, zoölogists are now generally agreed that there is but one, the *Moschus Moschiferus* of Linnæus. In size it is rather less than the European roe-deer, being about twenty inches high at the shoulder. Its limbs, especially the hinder ones, are long. The feet are remarkable for the great development of the lateral pair of hoofs, and for the freedom of motion they all present, so that they appear to have the power of grasping projecting rocky points—a power which must be of great assistance to the animal in steadying it in its agile bounds among the crags of its native haunts. The ears are large, and the tail quite rudimentary. The hair covering the body is long, coarse, and of a peculiarly brittle and pith-like character, breaking with the application of an extremely slight force; it is generally of a grayish brown color, sometimes inclined to yellowish red, and often variegated with lighter patches. The Musk-deer has a wide distribution over the highlands of central and eastern Asia, including the greater part of southern Siberia, and extends to Kashmir on the southwest and Cochin-China on the southeast, always, however, at great elevations—being rarely found in summer below 8,000 feet above the sea-level, and ranging as high as the limits of the thickets of birch, rhododendron, and juniper, among which it mostly conceals itself in the daytime. It is a hardy, solitary, and retiring animal, chiefly nocturnal in its habits, and almost always found alone, rarely in pairs and never in herds. It is exceedingly active and surefooted, having perhaps no equal in traversing rocks and precipitous ground; and it feeds on moss, grass, and leaves of the plants which grow on the mountains among which it makes its home.

MUSKEGON, the county seat of the county of the same name, is a port of Michigan, fourteen miles from Grand Haven, at the junction of several important railroads. The town was settled in 1836, became a city in 1870, and has now (1890) a population of 22,702. Its chief industry is the manufacture and shipment of lumber. The city contains a number of machine and boiler works, foundries, car-shops and other factories. It has numerous fine churches, a high school, opera-house, four newspaper offices and good schools.

MUSKELUNGE. See PIKE.

MUSK-OX. The animal commonly known by this

same, though approaching in size the smaller varieties of oxen, is in structure and habits closely allied to the sheep, its affinities being well expressed by the generic name *Ovibos* bestowed upon it by De Blainville.

The *Ovibos moschatus* about equals in size the small Welsh and Scotch cattle. The head is large and broad. The horns in the old males have extremely broad bases, meeting in the median line, and covering the brow and whole crown of the head. They are directed at first downward by the side of the face and then turn upward and forward, ending in the same plane as the eye. The ears are small, erect and pointed, and nearly concealed in the hair. The space between the nostrils and the upper lip is covered with short, close hair, as in sheep and goats, without any trace of the bare "muffle" of oxen. The greater part of the animal is covered with long brown hair, thick, matted and curly on the shoulders, so as to give the appearance of a hump, but elsewhere straight and hanging down—that of the sides, back and haunches reaching as far as the middle of the legs and entirely concealing the very short tail. There is also a thick woolly under-fur, shed in the summer. The hair on the lower jaw, throat, and chest is long and straight, and hangs down like a beard or dewlap, though there is no loose fold of skin in this situation as in oxen. The limbs are stout and short, terminating in unsymmetrical hoofs, the external being rounded, the internal pointed, and the sole partially covered with hair.

The Musk-ox is at the present day confined to the most northern parts of North America, where it ranges over the rocky barren grounds between the sixtieth parallel and the shores of the Arctic Sea. Its southern range is gradually contracting, and it appears that it is no longer met with west of the Mackenzie river, though formerly abundant as far as Eschscholtz Bay. Northward and eastward it extends through the Parry Islands and Grinnell Land to north Greenland, reaching on the west coast as far south as Melville Bay; and it was also met with in abundance by the German polar expedition of 1869–70 at Sabine Island on the east coast. No trace of it has been found in Spitzbergen or Franz Joseph Land.

MUSKRAT, a burrowing rodent, common in all parts of North America, and of habits somewhat similar to those of the beaver. Its fur is of some value as a substitute for the skin of that animal. The muskrat is very prolific. It is an awkward animal on land, but is very agile in the water, and it makes a nest or mound somewhat similar to that of the beaver.

MUSLIN, a term embracing the thin, delicate woven cotton fabrics, the lightest and most airy of all textures. The word is derived from Mosul; the original home of muslin-weaving is the East Indies, where even yet wonderful fabrics for airy lightness and delicacy continue to be woven with the aid of only the most rude and primitive appliances. The most delicate muslins are made at Dacca. Figured, embroidered, color-woven, and printed muslins are made at various places, principally in Madras province, and gold and silver printed muslins are made at Jeypore and Hyderabad in India. The making of muslin in Europe was first attempted at Glasgow by Robert Monteith about the year 1780, but he had to procure Indian bird-nest yarn for his web. The improvements in machinery effected about that time, however, soon enabled spinners to produce yarn of high counts, and thereafter the muslin trade took firm hold in the west of Scotland. In recent times the perfection of combing machinery, etc., has enabled spinners to supply yarn of much greater tenuity than has ever been spun in India, and indeed vastly finer than is of any use for weaving purposes.

MUSSCHENBROEK, PIETER VAN, natural philos-

opher, was born at Leyden in March, 1692, and died in 1761.

MUSSEL, a term applied in England to two families of Lamellibranch Mollusks. The Sea Mussel (*Mytilus edulis*) belongs to the second order of the class *Lamellibranchia*, namely the *Heteromya*, in which the anterior or pallial adductor is much smaller than the pedal or posterior adductor. The byssus is a collection of horny threads by which the Sea Mussel (like many other lamellibranch or bivalve mollusks) fixes itself to stones, rocks, or submerged wood, but it is not a permanent means of attachment, since it can be discarded by the animal, which, after a certain amount of locomotion, again fixes itself by new secretion of byssus from the foot. Such movement is, however, very rare.

Mytilus edulis is an exceedingly abundant and widely distributed form. It occurs on both sides of the northern Atlantic and in the Mediterranean basin. It presents varieties of form and color according to the depth of water and other circumstances of its habitat.

The Sea Mussel is scarcely inferior in commercial value to the oyster. The freshwater Mussels, *Anodon cygneus*, *Unio pictorum*, and *Unio margaritiferus*, belong to the order *Isomya* of lamellibranch mollusks, in which the anterior and posterior adductor muscles are equally developed.

MUSSELBURGH, a Scottish burgh of barony and regality, a municipal and parliamentary burgh in the parish of Inveresk and county of Midlothian, five and one-half miles east of Edinburgh. The population of the burgh in 1881 was 7,866.

MUSSET, ALFRED DE, poet, play-writer, and novelist, was born on December 11, 1810, in Paris. His father, Victor de Musset, who in the course of his life held several ministerial posts of importance, traced his descent back as far as 1140. In Alfred's childhood there were various things which fostered his imaginative power. He and his brother Paul, who afterward wrote a biography of Alfred, delighted in reading old romances together, and in assuming the characters of the heroes of these romances. But it was not until 1826 that Musset gave any definite sign of the mental force which afterward distinguished him. Shortly after his first attempt in verse he was taken by Paul Foucher to Hugo's house, where he met Alfred de Vigny, Mérimée, and Sainte-Beuve. It was under Hugo's influence, no doubt, that he composed a play. The scene was laid in Spain, and some lines, showing a marked advance upon his first effort, are preserved. In 1828, when the war between the classical and the romantic school of literature was growing daily more serious and exciting, Musset, who had published some verses in a country newspaper, boldly recited some of his work to Sainte-Beuve, who wrote of it to a friend, "There is among us a boy full of genius." At eighteen years old Musset produced a translation, with a few insertions of his own, of De Quincey's *Opium-Eater*. This was published by Mame, attracted no attention, and has been long out of print. His first original volume was published in 1829 under the name of *Contes d'Espagne et d'Italie*, had an immediate and striking success, provoked bitter opposition, and produced many unworthy imitations. In 1833 Musset published the volume called *Un Spectacle dans un Fauteuil*. The success of the volume seemed to be small in comparison with that of his *Contes d'Espagne*, but it led indirectly to Musset's being engaged as a contributor to the *Revue des Deux Mondes*. In this he published, in April, 1833, *André del Sarto*, and he followed this six weeks later with *Les Caprices de Marianne*.

The appearance of *Les Caprices de Marianne* in the *Revue* was followed by that of *Rolua*, a marked symptom

of the "maladie du siècle." Then came the unfortunate journey which Musset made to Italy with George Sand. It is well known that the rupture of what was for a time a most passionate attachment had a disastrous effect upon Musset, and brought out the weakest side of his moral character. He was at first absolutely and completely struck down by the blow. But it was not so well known until Paul de Musset pointed it out that the passion expressed in the *Nuit de Décembre*, written about twelve months after the journey to Italy, referred not to George Sand, but to another and quite different woman. The story of the Italian journey and its results are told under the guise of fiction from two points of view in the two volumes called respectively *Elle et Lui* and *Lui et Elle*. During Musset's absence in Italy *Fantasio* was published in the *Revue*, and not long after his return *On ne badine pas avec l'Amour* appeared in the same way. In 1835 he produced *Lucie*, *La Nuit de Mai*, *La Quenouille de Barberine*, *Le Chandelier*, *La Loi sur la Presse*, *La Nuit de Décembre*, and *La Confession d'un Enfant du Siècle*.

In 1836 appeared, among other things, *Il ne faut jurer de Rien*, a comedy which holds, and is likely long to hold, the stage of the Théâtre Français, and the beginning of the brilliant letters of Dupuis and Cotonet on romanticism. In 1839 were published the *Caprice* (which afterward found its way to the Paris stage through, in the first instance, the accident of Madame Allan the actress hearing of it in a Russian translation) and some of the *Nouvelles*. In 1839 he began a romance called *Le Poète Déchu*, of which the existing fragments are full of passion and insight. In 1840 he passed through a period of feeling that the public did not recognize his genius—as, indeed, they did not—and wrote a very short but very striking series of reflections headed with the words "À trente Ans," which Paul de Musset published in his *Life*. In 1841 there came out in the *Revue de Paris* Musset's *Le Rhin Allemand*, an answer to Becker's poem which appeared in the *Revue des Deux Mondes*. This fine war-song made a great deal of noise, and brought to the poet quantities of challenges from German officers. Between this date and 1845 he wrote comparatively little. In the last-named year the charming "proverbe" *Il faut qu'une Porte soit ouverte ou fermée* appeared. In 1847 *Un Caprice* was produced at the Théâtre Français, and the employment in it of such a word as "rebonsoir" shocked some of the old guard of the old school. In 1848 *Il ne faut jurer de Rien* was played at the Théâtre Français, and the *Chandelier* at the Théâtre Historique. Between this date and 1851 *Bettine* was produced on the stage and *Carmosine* written; and between this time and the date of his death, from an affection of the heart, in May, 1857, the poet produced no large work of importance.

MUSTANG. The small wild horse of the Southwestern States and Mexico is known by this name. It is undoubtedly a reversion from domesticated stock, for there were no horses on the Northern Continent when European settlers arrived, although there is geological evidence of their early existence. Mustangs are of small size, not over thirteen hands in height, active, strong and shy, and useful as saddle-horses. They run wild in large herds and are secured by lassoing.

MUSTARD. The varieties of mustard-seed of commerce are produced from several species of the Cruciferous genus *Brassica*. Of these the principal are the Black or Brown Mustard, *Brassica nigra*, the White Mustard, *Brassica alba*, and the Sarepta Mustard, *B. juncea*. The finest qualities of Black and White Mustard are cultivated in the eastern counties of England. The former is a plant requiring a rich soil and much

care in its treatment, but its seeds, which are very minute, weighing not more than one-fiftieth of a grain, are the most valuable for commercial purposes. The peculiar pungency and odor to which mustard owes much of its value are due to an essential oil developed by the action of water on two peculiar chemical substances contained in the black seed. These bodies are, a compound termed by its discoverers myronate of potassium, but since called sinigrin, and an albuminoid body, myrosin.

Both as a table condiment and as a medicinal substance, mustard has been known from a very remote period. The form in which table mustard is now sold dates from 1720, about which time Mrs. Clements of Durham hit on the idea of grinding the seed in a mill and sifting the flour from the husk. The bright yellow farina thereby produced under the name of "Durham mustard" pleased the taste of George I., and rapidly attained wide popularity. As it is now prepared mustard consists essentially of a mixture of black and white farina in certain proportions. Several grades of pure mustard are made containing nothing but the farina of mustard-seed, the lower qualities having larger amounts of the white cheaper mustard; and corresponding grades of a mixed preparation of equal price, but containing certain proportions of wheaten or starch flour, are also prepared and sold as "mustard condiment." The mixture is free from the unmitigated bitterness and sharpness of flavor of pure mustard, and it keeps much better.

MUTINY. This word, which primarily means a commotion and then an insurrection or sedition, is in English military law applied to a sedition in any forces belonging to Her Majesty's regular, reserve, or auxiliary forces, or navy. Such offenses are dealt with by courts-martial. For further details see **MILITARY LAW** and **COURT-MARTIAL**.

MUTTRA, a district in the lieutenant-governorship of the Northwestern Provinces, India, with an area of 1,453 square miles. The district consists of an irregular strip of territory lying on both sides of the Jumna. The general level is only broken at the southwestern angle by low ranges of limestone hills. The eastern half consists for the most part of a rich upland plain, abundantly irrigated by wells, rivers, and canals, while the western portion, though rich in mythological association and antiquarian remains, is comparatively unfavored by nature.

The census of 1881 returned the population of Muttra at 671,690.

MUTTRA, chief town and administrative headquarters of the above district, is situated on the right bank of the Jumna, about thirty miles above Agra, with a population of 55,016.

MUZAFFARGARH, a district in the lieutenant-governorship of the Punjab, India, with an area of 3,136 square miles. It occupies the extreme southern apex of the Sind Sagar Doab, the wedge-shaped tract between the Indus and the Five Rivers or Panjnad. Population (1890), 360,000.

MUZAFFARNAGAR or **MOZUFFERNUGGER**, a district in the lieutenant-governorship of the Northwestern Provinces, India, with an area of 1,656 square miles. It lies near the northern extremity of the Doab or great alluvial plain between the Ganges and the Jumna, and shares to a large extent in the general monotony of that level region. A great portion of the area is sandy and unfertile, but under irrigation the soil is rapidly improving and in many places the villages have succeeded in introducing a high state of cultivation. The census of 1881 returned the population at 758,444.

MUZAFFARNAGAR, chief town and administrative headquarters of the above district, is situated on the military road from Meerut to Landaur. The population in 1881 was 15,080.

MUZAFFARPUR, or **MOZUFFERPORE**, a district in the lieutenant-governorship of Bengal, India, with an area of 3,004 square miles. The census of 1881 returned the inhabitants at 2,582,060.

MUZAFFARPUR, chief town and administrative headquarters of the above district, is situated on the right or south bank of the Little Gandak river, with a population (1881) of 42,460.

MUZIANO, **GIROLAMO**, an eminent Italian painter, was born at Acquafredda, near Brescia, in 1528. Under Romanino, an imitator of Titian, he studied his art, designing and coloring according to the principles of the Venetian school. He died in 1590, or, according to another authority, in 1592, and was buried in the church of Santa Maria Maggiore.

MYCENÆ, one of the most ancient cities of Greece, was situated in the northeast extremity of the fertile Argive plain. Its situation is exceedingly strong, and it commands all the roads leading from Corinth and Achaia into the Argive plain; this fact, combined with its distance from the sea, shows that the city was founded by a race which came from the direction of Corinth and not by immigrants landing on the coast. The walls of Mycenæ are the greatest monument that remains of the Heroic age in Greece; parts of them are similar in style and doubtless contemporary in date with the walls of the neighboring town Tiryns, but other parts seem to be the work of a rather later time. There can therefore be little doubt that the two towns were the strongholds of a single race, Tiryns commanding the sea-coast and Mycenæ the inner country. The city of Argos, on the other hand, has no remains to connect it with this early Mycenaean race; and legend tells of the rivalry between the dynasties of the Pelopidæ at Mycenæ and of the Proetidæ at Argos. The long warfare between the two cities lasted till 468 B.C., when Mycenæ was dismantled and its inhabitants dispersed. The city never revived; Strabo asserts that no trace of it remained in his time, but Pausanias describes the ruins.

Subjoined are the most important monuments. 1. The "Treasures" of Atreus and his sons, as Pausanias calls them. They were subterranean buildings of beehive shape, in the side of the hill southwest of the city; one of them is still almost perfect. A sloping passage, *δρόμος*, led to the doorway, with its ornamented columns, at the base of the building. The great circular chamber inside was probably covered with plates of bronze; a door in one side admitted to a second smaller chamber. Such buildings, which are found in other parts of Greece—e.g., Orchomenus, Sparta, Attica, Iolcus, etc.—were undoubtedly the sepulchers of noble families.

2. The graves discovered by Dr. Schliemann in 1876, within the city wall. They are inclosed within a circular *περίβολος* with a single entrance, and the place was therefore a holy place in the ancient Mycenaean time; on the other hand the part of the city wall which incloses them is a later addition to the original wall. At some period before 468 B.C. this addition was built; before that time the *περίβολος* was outside the wall. Some heroes of the race were worshiped here by the ancient inhabitants, but their names are not recorded by any trustworthy authority. In the time of Pausanias, six centuries after Mycenæ was destroyed, local legend maintained that these were the graves of Atreus, Agamemnon, Cassandra and her children, and Eurymedon; but it is uncertain whether this was the original legend, or a later tale that grew under the influence of Greek literature.

3. The Lion-Gate. The principal entrance to the city is approached by a *δρόμος*, flanked on each side by the city wall and leading up to a gateway. Over the entrance is placed a triangular slab of stone on which are carved two lions in relief; they are rampant, facing one another, but separated by an upright column. The art of this relief shows no resemblance to archaic Greek art; it is foreign in character, the work of an immigrant race, which brought with it a well-developed civilization.

Greek legend always maintains that the Pelopidæ of Mycenæ came from Phrygia, and this is corroborated by the evidence of archaeology. The objects found in excavations, and the sculptured ornament on the doorways of the "Treasures" and over the Lion-Gate, all point to foreign influence and particularly to Asia Minor. The same type of the two lions and the column has been recently found over the entrance to a colossal sepulcher in the rocks near the southwestern corner of the Sangarius valley in Phrygia. Legend and remains alike show that a rich and powerful dynasty of foreign origin ruled at Mycenæ; the only early remains in the Greek world that equal them in interest are the ruins of ancient Troy.

MYDDLETON, **SIR HUGH**, the projector of the New River scheme for supplying London with water, was the sixth son of Richard Myddleton, governor of Denbigh Castle in the reigns of Edward VI., Mary, and Elizabeth, and was born about 1555. Myddleton worked silver and lead mines in Cardiganshire, and in this way obtained the practical knowledge of engineering which enabled him to put in operation his scheme for supplying London with water (see LONDON). In recognition of his services he was created a baronet by James I. in 1622; but pecuniarily the enterprise was a complete failure. Myddleton died December 10, 1631.

MYELITIS is a disease which by inflammation induces destructive changes in the tissues composing the spinal cord. In the *acute* variety the nerve elements in the affected part become disintegrated and softened, but repair may take place; in the *chronic* form the change is slower, and the diseased area tends to become denser (sclerosed), the nerve-substance being replaced by connective tissue. Myelitis may affect any portion of the spinal cord, and its symptoms and progress will vary accordingly. The chief causes of myelitis are injuries or diseases affecting the spinal column, extension of inflammation from the membranes of the cord to its substance (see MENINGITIS), exposure to cold and damp, and occasionally some pre-existing constitutional morbid condition, such as a fever. Any debilitating cause or excess in mode of life will act powerfully in predisposing to this malady. The disease is most common in adults.

MYNPOOREE. See **MAÍNPURÍ**.

MYRIAPODA. The Myriapoda or Centipedes are usually treated of in text-books as one of the classes of the group Arthropoda, being associated in that group with the Crustacea, Arachnida, and Insecta, as equivalent divisions of the animal kingdom. In consequence, however, of recent evidence which points to a community of origin of all the tracheate forms apart from that of the crustacea, it is probably more natural to divide the arthropoda (with the exception of certain minor groups of obscure affinities) into two classes, one consisting of the crustacea, the other of the tracheata. If this plan of classification be adopted, the Myriapoda form a sub-class of the tracheata.

MYRISTICA. See **NUTMEG**.

MYROBALANS. See **LEATHER**.

MYRON, one of the chief sculptors of the older Attic school, was born at Eleutheræ, on the borders of Boeotia and Attica, and flourished in the middle of the

fifth century B.C. He was, like Phidias, a pupil of Ageladas of Argos. He worked almost exclusively in bronze; the only known exception is his wooden statue of Hecate at Ægina.

MYRRH is a gum-resin highly esteemed by the ancients as an unguent and perfume, used for incense in temples and also in embalming. The word is Semitic; it appears in the Old Testament as *Mor*, in Arabic as "morr." In Exod., "pure myrrh" should rather be "flowing myrrh," that is, the "myrrha stacte" of classical writers—the finest myrrh, according to Pliny, exuding without incisions in the bark. Myrrh was one of the gifts offered by the Magi, and a royal oblation of gold, frankincense, and myrrh is still annually presented by the queen on the feast of Epiphany in the Chapel Royal in London, this custom having been in existence certainly as early as the reign of Edward I. Until the present century the botanical source of myrrh was enveloped in great obscurity. In 1826 Ehrenberg brought home specimens of the myrrh trees found at Jízán on the east side of the Red Sea, and also on the neighboring mountains of Jara. The more recent investigations of Hildebrandt (1878) show that one of the plants brought home by Ehrenberg and named *Balsamodendron Myrrha* yields the true myrrh. It was found by Hildebrandt growing on sunny slopes of the Sarát mountains at an elevation of 1,600 to 3,200 feet. Myrrh is chiefly collected in the Somali country and in the neighborhood of Harar, southwest of Zeila, in the months of July and August, and is brought to the great fair of Berbera held in November, December, and January. Thence it is transported to Aden and shipped to Bombay, where it is sorted, the inferior kinds being sent chiefly to China and the finer sorts to Europe. Myrrh of the best quality is known as Turkey myrrh, and the inferior quality as East Indian myrrh, from being exported from Bombay. At the present time, however, all myrrh is imported either direct from Aden or from Bombay. The Somalis also cross over to the Arabian shore and collect this gum-resin on the hills about Shugra and Sureea to the east of Aden, where myrrh-trees abound.

As met with in commerce true myrrh occurs in pieces of irregular size and shape, from half an inch to two or three inches in diameter, and of a reddish-brown color. The transverse fracture has a resinous appearance with white streaks; the flavor is bitter and aromatic and the odor characteristic. It consists of a mixture of resin, gum, and essential oil in varying proportions from 23 to 44 per cent, the resin being present in good specimens to the extent of 27 per cent, and the oil from $\frac{3}{4}$ to 3 per cent. The resin appears to be a complex body, partly soluble in ether and partly in bisulphide of carbon. The gum is soluble in water and forms an adhesive mucilage. The odor of myrrh is due to the volatile oil, which is heavier than water. The bitterness is believed to be due to a glucoside, the chemical constitution of which has not been ascertained. It is obtained by treating with warm water the resin extracted by means of alcohol.

Myrrh is used in medicine at present chiefly as an auxiliary to other drugs, such as iron and aloes, in order to strengthen and modify their action.

MYRTLE. The *myrtus* of the Romans, and the Myrtle, *Myrtus communis*, of botanists, as now found growing wild in many parts of the Mediterranean region, doubtless all belong to one and the same species. It is a low-growing evergreen shrub, with opposite leaves varying in dimensions, but always small, simple, dark-green, thick in texture, and studded with numerous receptacles for oil. When the leaf is held up to the light it appears as if perforated with pin-holes

owing to the translucency of these oil cysts. The fragrance of the plant depends upon the presence of this oil.

MYSIA, in ancient geography, was the name given to a province in the northwest of Asia Minor, which was bounded by Lydia and Phrygia on the south, by Bithynia on the northeast, and by the Propontic and Ægean Sea on the north and west. But its precise limits are very difficult to assign—the frontier on the side of Phrygia being, as observed by Strabo himself, very vague and fluctuating, while the northwestern corner of the province adjoining the Hellespont, was usually separated from Mysia under the name of the Troad, a district which was sometimes included in the name of Mysia, sometimes not.

MYSORE or MAISÚR (*i.e.*, Mahesh-asura, "Buffalo-demon") is a native state in southern India, surrounded entirely by British territory, with an area of 24,723 square miles. The Mysore country above the Gháts, though frequently called "the tableland," is by no means flat or a plain, but is in some parts mountainous and everywhere undulating. Mysore is naturally divided into two regions of distinct character—the hill country, called the Malnád, on the west, and the more open country, known as the Maidán, comprising the greater part of the state, where the wide-spreading valleys and plains are covered with villages and populous towns. The drainage of the country, with a slight exception, finds its way into the Bay of Bengal, and is divisible into three great river systems—that of the Krishna, on the north, the Cauvery, on the south, and the Pennair, Penar, and Palar, on the east. The streams which gather from the hillsides and fertilize the valleys are embanked at every favorable point in such a manner as to form a series of reservoirs or tanks, the outflow from one at a higher level supplying the next lower, and so on all down the course of the stream at short intervals. These tanks, varying in size from small ponds to extensive lakes, are dispersed throughout the country to the number of 20,000; the largest is the Sulukere Lake, forty miles in circumference.

The census of 1881 returned the population of Mysore at 4,186,188. The population of the chief towns in the executive districts was as follows:—Bangalore, 155,857; Mysore, 60,292; Shimoga, 12,040; Kolar, 11,172; Tumkúr, 9,909; Chikmagalur, 7,088; Hassan, 5,950; and Chitalchoog, 4,271.

MYSORE, the ancient capital of the above state, is situated ten miles southwest of Seringapatam, with a population of 60,292 in 1881. The town, which is spread over an area of about three square miles, lies at the foot of the Chámundi hill, in a valley formed by two parallel ridges running north and south. The streets generally are broad and regular, except in the fort. The majority of the houses are tiled, and some of them are substantial buildings two or three stories high. Altogether, the town has a clean and prosperous look, and its sanitary condition has been greatly improved of late years.

MYSTERIES. This name was applied to certain ceremonies in Greek religion which were esteemed peculiarly sacred and might not be freely spoken about. The subject is one of great difficulty on account of the absolute silence maintained with regard to it by many writers, and the guarded terms in which the few references to it are couched. The obligation to silence was not felt by the Christian writers, and it is to them that we owe most of our knowledge. Their testimony is of doubtful value, and it has been keenly debated whether any trust can be placed in it; but it is in such perfect accord with the few references in pagan authors that this skepticism is unjustifiable.

Of the many Mysteries which existed in different parts of Greece, the Eleusinian were the most famous, the most widely popular, the most representative in every way. In several parts of Greece—*e.g.*, at Phlius—there were Mysteries directly adopted from Eleusis; in other places, such as Lerna, Andania, etc., a genuine old mystic cultus was greatly modified by the same example. The Christian writers therefore direct their polemic mainly against the Eleusinian Mysteries, and the material for study is far less scanty in their case than in any other.

MYSTERY, or MIRACLE PLAY. See DRAMA.

MYSTICISM is a phase of thought, or rather perhaps of feeling, which from its very nature is hardly susceptible of exact definition. It appears in connection with the endeavor of the human mind to grasp the divine essence or the ultimate reality of things, and to enjoy the blessedness of actual communion with the Highest.

In the East, mysticism is not so much a specific phenomenon as a natural deduction from the dominant philosophic systems, and the normal expression of religious feeling in the lands in which it appears. Brahmanic pantheism and Buddhistic nihilism alike teach the unreality of the seeming world, and preach mystical absorption as the highest goal; in both, the sense of the worth of human personality is lost. India consequently has always been the fertile mother of practical mystics and devotees.

For opposite reasons, neither the Greek nor the Jewish mind lent itself readily to mysticism—the Greek, because of its clear and sunny naturalism; the Jewish, because of its rigid monotheism and its turn toward worldly realism and statutory observance. It is only with the exhaustion of Greek and Jewish civilization that mysticism becomes a prominent factor in Western thought. It appears, therefore, contemporaneously with Christianity, and is a sign of the world-weariness and deep religious need that mark the decay of the old world. Whereas Plato's main problem had been the organization of the perfect state, and Aristotle's intellect had ranged with fresh interest over all departments of the knowable, political speculation had become a mockery with the extinction of free political life, and knowledge as such had lost its freshness for the Greeks of the Roman empire. Knowledge is nothing to these men if it does not show them the infinite reality which is able to fill the aching void within. Accordingly, the last age of Greek philosophy is theosophical in character, and its ultimate end is a practical satisfaction. Neo-Platonism seeks this in the ecstatic intuition of the ineffable One. The systematic theosophy of Plotinus and his successors does not belong to the present article, except so far as it is the presupposition of their mysticism; but the mysticism of the mediæval church is directly derived from Neo-Platonism through the speculations of the Pseudo-Dionysius.

MYTHOLOGY is the science which examines legends of cosmogony and of gods and heroes. Mythology is also used as a term for these legends themselves. Thus when we speak of "the mythology of Greece" we mean the whole body of Greek divine and heroic and cosmogonic legends. When we speak of the "science of mythology" we refer to the various attempts which have been made to explain these ancient narratives. Very early indeed in the history of human thought men awoke to the consciousness that their religious stories were much in want of explanation. The myths of civilized people, as of Greeks and the Aryans of India, contain two elements, the rational and the irrational. The rational myths are those which represent the gods as beautiful and wise beings. The Artemis of the *Odyssey* is a perfectly rational mythic representation of

a divine being. We feel, even now, that the conception of a "queen and huntress, chaste and fair," the lady warden of the woodlands, is a beautiful and natural fancy which requires no explanation. On the other hand, the Artemis of Arcadia, who is confused with the nymph Callisto, who, again, is said to have become a she-bear, and later a star, and the Brauronian Artemis, whose maiden ministers danced a bear-dance, are goddesses whose legend seems unnatural, and is felt to need explanation. Or, again, there is nothing not explicable and natural in the conception of the Olympian Zeus as represented by the great chryselephantine statue of Zeus at Olympia, or in the Homeric conception of Zeus as a god who "turns everywhere his shining eyes" and beholds all things. But the Zeus whose grave was shown in Crete, or the Zeus who played Demeter an obscene trick by the aid of a ram, or the Zeus who, in the shape of a swan, became the father of Castor and Pollux, or the Zeus who was merely a rough stone, or the Zeus who deceived Hera by means of a feigned marriage with an inanimate object, or the Zeus who was afraid of Attes, is a being whose myth is felt to be unnatural and in great need of explanation. It is this irrational and unnatural element—as Mr. Max Müller says, "the silly, senseless, and savage element"—that makes mythology the puzzle which men have so long found it.

The earliest attempts at a crude science of mythology were efforts to reconcile the legends of the gods and heroes with the religious sentiment which recognized in these beings objects of worship and respect. Closely as religion and myth are intertwined, it is necessary to hold them apart for the purposes of this discussion.

Later Explanations of Mythology.—The ancient systems of explaining what needed explanation in myths were physical, ethical, religious, and historical. One student, like Theagenes, would see a physical philosophy underlying Homeric legends. Another, like Porphyry, would imagine that the meaning was partly moral, partly of a dark theosophic and religious character. Another would detect moral allegory alone, and Aristotle expresses the opinion that the myths were the inventions of legislators "to persuade the many, and to be used in support of law." A fourth, like Euemerus, would get rid of the supernatural element altogether, and find only an imaginative rendering of actual history. When Christians approached the problem of heathen mythology, they sometimes held, with St. Augustine, a form of the doctrine of Euemerus. In other words, they regarded Zeus, Aphrodite, and the rest as real persons, diabolical, not divine. Some later philosophers, especially of the seventeenth century, misled by the resemblance between Biblical narratives and ancient myths, came to the conclusion that the Bible contains a pure, the myths a distorted, form of an original revelation.

Up to a very recent date students of mythology were hampered by orthodox traditions, and still more by ignorance of the ancient languages and of the natural history of man. Only recently have Sanskrit and the Egyptian and Chaldean languages become books not absolutely sealed. Again, the study of the evolution of human institutions from the lowest savagery to civilization is essentially a novel branch of research, though ideas derived from an unsystematic study of anthropology are at least as old as Aristotle. The new theories of mythology are based on the belief that "it is man, it is human thought and human language combined, which naturally and necessarily produce the strange conglomerate of ancient fable."

MYTILENE. See LESBOS.

MZENSK, another form of MTSENSK, (*q.v.*)

N.

N denotes the dental nasal in all the languages in which our alphabet is used. But the sound which we call the dental nasal varies slightly in different languages according to the position of the point of the tongue. This may be pressed against the back of the teeth; and then we have a true "dental" sound. But the point of the tongue may also be placed not against the teeth but against the front part of the palate immediately behind the gums; and it is in this way that our English dentals are formed.

This same letter N, either alone or together with another letter, or distinguished by some diacritical mark, can be used for a much wider range of nasal sounds. It has been already pointed out (see letter M) that there are in every language as many nasals as there are clearly distinguished classes of sound produced at different parts of the mouth, *e.g.*, guttural or back-palatal, front-palatal, dental, labial, and others less easily apprehended. Each of these classes will have its nasal, which will vary from the sonant of the class only by the different position of the uvula: for the sonant (as, for example, *d*) the uvula is pressed up so as to cover the passage through the pharynx into the nostrils, and the voice therefore escapes wholly through the mouth; for the nasal (as for *n*) the uvula hangs down, so that the voice passes partly behind it through the nose, partly through the mouth; in all other respects the position of the vocal organs for *d* and *n* is just the same, and the material of the sound is the same, *i.e.*, breath made sonant by the vibration of the glottis. In an improved alphabet, therefore, we ought in each language to have several symbols for the nasals, as in Sanskrit, which had five different symbols. But no European language has more than two simple symbols; and, of these two, *m* is confined to one class, *viz.*, the labial; *n*, simple or modified, denotes the other sounds, and therefore often differs in different languages, and sometimes in the same language. It may also be employed to denote a wholly different class of sounds, as the nasalized vowels of the French.

NABATÆANS, a famous people of ancient Arabia, whose settlements in the time of Josephus gave the name of Nabatene to the border-land between Syria and Arabia, from the Euphrates to the Red Sea. The language of Josephus suggests, and Jerome, apparently following him, directly affirms, that the name is identical with that of the Ishmaelite tribe of Nebaioth, which in later Old Testament times had a leading place among the northern Arabs.

NABHA, or **NARBAL**, one of the Cis-Sutlej states in the Punjab, India, has an area of 863 square miles, with a population in 1881 of 261,824.

NABULŪS, or **NABLŪS**. See **SHECHEM**.

NADĪM. Abulfaraj ibn Ishāk of Bagdad, known as Ibn abī Ya'kūb al-Nadīm (*ob.* 995 A.D.), is the author of one of the most interesting works in Arabic literature, the *Fihrist*, or "list of the books of all nations

that were to be found in Arabic," with notices of the authors and other particulars, carried down to the year 377 A.H. (987-88 A.D.). A note in the Leyden MS. places the death of the author eight years later. Of his life we know nothing; the name Nadīm belonged to a distinguished family of Persian origin.

NADIR SHAH. See **PERSIA**.

NADIYÁ, or **NUDDEA**, a district in the lieutenant-governorship of Bengal, with an area of 3,404 square miles. It is emphatically a district of great rivers. Standing at the head of the Gangetic delta, its alluvial surface, though still liable to periodical inundation, has been raised by ancient deposits of silt sufficiently high to be permanent dry land. Along the entire northeastern boundary flows the wide stream of the Padmá or Ganges; and all the remaining rivers of the district are offshoots of the great river. The census of 1881 returned the population at 2,017,847.

Rice is the staple crop, and there are four harvests in the year. Indigo is the chief export staple; but the district was the center of the indigo riots in 1860, and the industry then received a blow from which it has never recovered.

NÆVIUS, **GNÆUS**, is the second in order of time among the creators of Latin literature. He made his appearance as an author within five years after the first dramatic representation of Livius Andronicus; he was some ten or fifteen years older than Plautus, and preceded Ennius by a generation. As distinguished from Livius he was a native Italian, not a Greek; he was also a writer of original power, not a mere adapter or translator. If it was due to Livius that the forms of Latin literature were, from the first, molded on those of Greek literature, it was due to Nævius that much of its spirit and substance was of native growth.

He was not only the oldest native dramatist, but the first author of an epic poem—which, by combining the representation of actual contemporary history with a mythical background, may be said to have created the Roman type of epic poetry.

NÆVUS, a term in surgery signifying that form of tumor which is almost entirely composed of enlarged blood-vessels. There are three principal varieties:—(1) the capillary nævus, consisting of enlarged capillaries, frequently of a purplish color, hence the term "port-wine stain;" (2) the venous nævus, in which the veins are enlarged, of a bluish color; (3) the arterial nævus, in which there is a distinct pulsation, it being composed of enlarged and tortuous arteries. The nævus can be lessened in size by pressure. It is generally met with in the skin or immediately under the skin; sometimes it lies in the mouth in connection with the mucous membrane. It is often congenital, hence the term "mother's mark," or it may appear in early childhood. It often grows rapidly, sometimes slowly, and sometimes growth is checked, and it may gradually diminish in size, losing its vascularity and becoming fibrous and

non-vascular. This natural cure is followed by less deformity than a cure by artificial means. It is a good rule not to interfere unless the tumor is growing rapidly and at a rate out of proportion to the growth of the child.

NÁGÁ HILLS, a district in the southeastern corner of the chief-commissionership of Assam, India, being a mountainous borderland between Nowgong district and Manipur state, with an area of about 6,400 square miles. It forms a wild expanse of forest, mountain, and stream.

NAGASAKI, or sometimes **NANGASAKI**, the leading seaport on the western coasts of Japan, is situated in the island of Kiu-shiu, and gives its name to a *ken* (province of Hizen or Hi-shiu). The harbor is formed by a beautiful inlet of the sea, stretching northward for a distance of about four miles, with an average width of about a mile, inclosed on both sides by a delightful framework of hills (1,500 feet), and adorned by a number of the most picturesque-looking islands. The city lies near the upper end of the inlet on its eastern side, extending about a mile in length and three-quarters of a mile in breadth. Immediately to the south, and connected with the mainland by a bridge, lies the half-artificial island of Desima (600 feet by 240), which, originally occupied by the Portuguese (1637-39), was for more than 200 years (1641-1854) the trading post and prison-house of the Dutch traders. Southward along the shore, on ground largely reclaimed from the sea, runs the foreign settlement, with the American, British, French, and Portuguese consulates on the hilly ground behind. The magnificent dock, commenced by the prince of Hizen in 1865, and rebuilt in 1874-79, occupies a deep gorge between two hills at Tatagami, on the western side of the firth opposite the city; a few hundred yards to the north of the dock are the engine-works of Akaonura (with an area of seven acres); and at Koski there is a fine patent slip constructed for the prince of Satsuma (the prince of Hizen's rival). Nagasaki is laid out with great regularity and neatness, the streets crossing each other at right angles; beginning to climb the hills, they not infrequently end in stairs. Among the public buildings may be mentioned the hospital established in 1861, the oldest in Japan, and the great government school, with its department for European languages and sciences, attended by hundreds of Japanese of all ages and ranks. Population, about 80,000.

NAGÍNA, a town in Bijnaur district, Northwestern Provinces of India, is situated on the road from Hardwar to Muradábád, with a population of 20,503.

NAGOYA, sometimes **NOGOYA**, one of the largest and most active of the cities of Japan, the chief town of Aichi *ken* (province of Owari), and formerly the seat of the princes of Owari (one of the "three august families" closely allied to the Tokugawa line of Shoguns), lies at the head of the shallow Owari Bay, about thirty miles from Yokai-ichi, its port, with which it communicates by light-draught steamers. Nagoya is well known as one of the great seats of the pottery trade (though the master potters for the most part get their goods manufactured at Seto, about thirteen miles distant, where the clay has been worked for wellnigh two thousand years); fans and enamels are also made in the city. The population is 325,000.

NÁGPUR, a district in the division of the same name, in the Central Provinces of India, with an area of 3,786 square miles. Nágpur district lies immediately below the great table-land of the Sátapura range. The population in 1881 was 697,356. Of the area of 3,786 square miles, 1,863 were cultivated in 1882.

NÁGPUR, the chief town of Nágpur district, and the

administrative headquarters of the Central Provinces, India, is situated in the center of the district, on the banks of a small stream, the Nág. The population was 79,842 in 1881.

NAGY-KÖRÖS, (*i.e.*, Great Körös) is a town or rather an overgrown village, in Hungary, in the district and fifty miles to the southwest of Pesth. In 1880 it contained 22,769 inhabitants, chiefly Protestants.

NAGY-VÁRAD. See **GROSSWARDEIN**.

NAHARRO, **BARTOLOMÉ DE TORRES**, a Spanish dramatist of the period immediately preceding that of Cervantes and Lope de Vega, born at Torres in the neighborhood of Badajoz, was for some time a captive in Algiers, and after receiving his freedom visited the court of Leo X. at Rome. Here his satirical pen excited such hostility that he was compelled to fly to Naples, where he lived for some time under the protection of Fabricio Colonna, and where he published his *Propaladia* in 1517. He died in poverty and obscurity; the time and place are unknown.

NAHUM. "The book of the vision of Nahum the Elkoshite," which stands seventh among the minor prophets, is entirely directed against Nineveh, and predicts the utter destruction of the bloody and rapacious city, its empire, and its gods by the tardy but sure and irresistible vengeance of Jehovah.

NAIADS. See **NYMPHS**.

NAILS. A nail is a headed pin or spike of metal, commonly of iron. The primary and principal use of nails is in woodwork (joinery and carpentry), but they are also employed in upholstery, shoemaking, saddlery, slating, sheet-metal working, horseshoeing, and numerous other trades. The consumption in all civilized communities is enormous, but it is exceptionally great where timber houses and wooden erections generally prevail, as in the United States and in many British colonies. Size, form of head, nature of point, and special uses all give names to different classes of nails. Thus we have the names tacks, sprigs, and brads for very small nails; rose, clasp, and clout, according to the form of head; and flat points or sharp points, according to the taper of the spike. Arranged according to the manner in which they are manufactured, nails may fall into four principal classes:—(1) Ordinary or hand-wrought nails; (2) machine-wrought and cut nails; (3) wire or French nails; and (4) cast nails. The nailer handicraft was at one time a great industry in the country around Birmingham, and to this day in conjunction with chain-making it constitutes an important though declining trade. It is essentially a family industry, carried on in the meanest of workshops, with a very few simple blacksmith's tools and appliances. The nails are forged from nail-rods heated in a small smith's hearth, hammered on a low anvil, the nail length cut off on a chisel attached to the anvil, and the head formed by dropping the spike into a hole in a "bolster" of steel, from which enough of the spike is left projecting to form the head, which is variously flattened out. The head, in the case of clasp nails, is formed with two strokes of the hammer, while rose nails require four blows. The heads of the larger-sized nails are made with the aid of an "oliver" or mechanical hammer, and for ornamental or stamped heads "swages" or dies are employed. The conditions of life and labor among the hand nailers in England are exceedingly unsatisfactory; married women and young children of both sexes work long hours in small, filthy sheds attached to their dwellings, and their employment is controlled by middle-men or nail-masters, who supply them with the nail-rods and pay for work done, sometimes in money and sometimes in kind on the truck system. The handicraft is, however, an expiring industry, as machine-wrought and cut nails are rapidly supplanting most cor-

responding kinds of hand-made nails. Horse nails alone continue to be made in large measure by hand labor in England. The credit of perfecting machinery for the making of nails belongs to American inventors, and by numerous stages the nail-making machines have arrived at a high degree of efficiency. Of late years mild steel, such as the plates employed for shipbuilding, has been largely used for machine-made nails.

The machines turn out nails with wonderful rapidity, varying with the size of the nails produced from about 100 to 1,000 per minute. Wire or French nails are made from round wire, which is unwound, straightened, cut into lengths, and headed by a machine the same in principle as the pin-making apparatus (see PINS), but the pointing is accomplished by the pressure of dies in the same manner as the head is formed. Cast nails, which are cast in sand molds by the ordinary process, are used principally for horticultural purposes, and the hobnails or tackets of shoemakers are also cast.

NAIN, LE. The three brothers Le Nain, who have of late attracted much attention, occupy a peculiar position in the history of French art. Although they figure among the original members of the French Academy, their works show no trace of the influences which prevailed when that body was founded. Their sober execution and choice of color recall characteristics of the Spanish school, and when the world of Paris was busy with mythological allegories, and the "heroic deeds" of the king, the three Le Nain devoted themselves chiefly to subjects of humble life such as *Boys Playing Cards*, *The Forge*, or *The Peasants' Noonday Meal*. These three paintings, together with others, among which is the noble *Procession in the Interior of a Church* (erroneously attributed to the Le Nain), are now in the Louvre. Their lives are lost in obscurity; all that can be affirmed is that they were born at Laon in Picardy early in the seventeenth century.

NAIRN, a small maritime county in the northeast of Scotland, is bounded west and south by Inverness, east by Elgin, and north by the Moray Firth. Its greatest length from north to south is about twenty miles, and its greatest breadth about fifteen miles; the area is 114,400 acres, or about 179 square miles. Population (1890), 11,000.

NAIRN, a royal and parliamentary burgh and county town, is situated near the Moray Firth, on the left bank of the Nairn, and on the Highland Railway, ninety-three miles west-northwest of Aberdeen and fifteen northeast of Inverness. Population, 4,665.

NAIRNE, CAROLINE OLIPHANT, BARONESS, the authoress of many fine Scotch songs, was born in Perthshire, August 16, 1766, and died in 1845.

NAKHICHEVAN, or **NAKHJEVAN**, a city of Russian Armenia, the chief town of a circle in the government of Erivan, is situated 100 miles southeast of Erivan and 267 miles from Tiflis. It occupies the brow of one of the last spurs of the Karabakh Mountains (Anti-Caucasus), and looks out over the wide and beautiful valley of the Araxes. Situated on the high road to Tabriz and Teheran, Nakhichevan is a seat of considerable transit trade. Population (1890), 7,000.

NAKHICHEVAN-ON-THE-DON, a town of southern Russia, situated in the government of Ekaterinoslaff, district of Rostoff, on the right bank of the Don. Owing to the fertility of the region, its advantageous situation for trade, and the privileges granted to the settlers, Nakhichevan soon became a wealthy place, and it still is the administrative center of the "Armenian district," which extends as a narrow strip along the banks of the Don, with a population of upward of 25,000.

NAMAQUALAND, a vast region of southwestern

Africa, extending along the west coast for a distance of 600 miles from the south of Damaraland, to the north of the county of Clanwilliam, and stretching inland from 80 to 350 miles. It is divided by the lower course of the Orange River into two portions—Little Namaqualand to the south, and Great Namaqualand to the north. Little Namaqualand, incorporated with Cape Colony since 1865, has an area of 20,635 square miles, and a population of 12,233, of whom 2,675 were whites. The seat of magistracy is at Springbokfontein, on a branch of the Buffels River, about sixty miles from the coast, with which it communicates by a mule-railway (ninety-six miles long), ending at Port Nolloth on Robbe or Seal Bay. Ookiep, six miles to the north of Springbokfontein, is next to the diamond fields of Kimberley, the most important mining place in South Africa, its copper mines, giving employment to about 1,500 people; the output in 1882 was 16,311 tons of extremely rich ore. The European miners are mainly from Cornwall and Mansfield. Copper is also worked at Concordia, Spektakel, and (since 1853) Kudas. Great Namaqualand has an area of 987,000 square miles, but its population does not exceed 20,000, mostly Namaquas and other Hottentots (see HOTTENTOTS).

NAMES. Names, and the study of proper names of persons and places, are not without scientific and historical importance, but, on the whole, are perhaps rather matter of curious interest. It stands to reason, that, even in the earliest societies of "*articulate speaking men*," all known persons, places, and groups of human beings must have had names by which they could be spoken of and by which they were recognized. The study of these names and of their survival in civilization enables us in some cases to ascertain what peoples inhabited districts now tenanted by persons of far different speech.

The Romans have left us names connected with camps (*castra*, *chesters*) and military roads; the English have used simple descriptions of the baldest kind, or have exhibited their attachment to the idea of property; the Celtic names (like those which the red men have left in America, or the blacks in Australia) are musical with poetic fancy, and filled with interest in the aspects and the sentiment of nature. The Anglo-Saxon race carries with it the ancient names of an older people into every continent, and titles perhaps originally given to places in the British Isles by men who had not yet learned to polish their weapons of flint may now be found in Australia, America, Africa, and the islands of the furthest seas.

Local names were originally imposed in a handy local manner. The settler or the group of cave-men styled the neighboring river "the water," the neighboring hill "the peak," and these terms often still survive in relics of tongues which can only be construed by the learned. The history of personal names is longer and more complex, but proceeds from beginnings almost as simple. But in personal names the complexity of human character, and the gradual processes of tangling and disentangling the threads of varied human interest, soon come in, and personal names are not imposed once and for all. Each man in very early societies may have many names, in different characters and at different periods of his life. The oldest personal names which we need examine here are the names which indicate, not an individual, but a group, held together by the conscious sense or less conscious sentiment of kindred, or banded together for reasons of convenience. An examination of customs prevalent among the most widely separated races of Asia, Africa, Australia, and America proves that groups conceiving themselves to be originally of the same kin are generally styled by the name of some animal or

other object (animate or inanimate) from which they claim descent. This object is known as the "totem," from the Red-Indian word *dodhaim*. Of this topic it must here suffice to say that the earliest and most widely spread class and family names among uncivilized people are totemistic. Unmistakable traces of the same habit of naming exist among Semitic and Teutonic races, and even among Greeks and Romans. In addition to the totem names (which indicate, in each example, supposed blood-kindred), *local* aggregates of men received local names. We hear of the "hill-men," "the cave-men," "the bush-men," "the coast-men," the "men of the plain," precisely as in the old Attic divisions of Aktaioi, Pediaioi, and so forth. When a tribe comes to recognize its own unity, as a rule it calls itself by some term meaning simply "the men," all other tribes being regarded as barbarous or inferior. Probably other neighboring tribes also call themselves "the men," in another dialect or language, while the people in the neighborhood are known by an opprobrious epithet, as *Rakshasas* among the early Aryan dwellers in India, or *Eskimo* (raw-eaters) in the far north of the American continent.

Leaving tribal for personal names, we find that, among most uncivilized races, a name (derived from some incident or natural object) is given at the time of birth by the parents of each new-born infant. In most cases the name (the earliest name) denotes some phenomenon of nature; thus Dobrizhofer met in the forests a young man styled "Gold flower of day," that is "Dawn," his father having been named "Sun." Similar names are commonly given by the natives of Australia, while no names are more common among North-American Indians than those derived from sun, moon, cloud, and wind. The names of savage persons are not permanent. The name first given is ordinarily changed (at the ceremony answering to confirmation in church) for some more appropriate and descriptive nickname, and that, again, is apt to be superseded by various "honor-giving names" derived from various exploits. When society grows so permanent that male kinship and paternity are recognized, the custom of patronymics is introduced. The totem name gives place to a gentile name, itself probably a patronymic in form; or, as in Greece, the gentile name gives place to a local name, derived from the *dème*. Thus a Roman is called Caius; Julius is his gentile name (of the Julian clan); Cæsar is a kind of hereditary nickname.

This system of names answered the purposes of Greek and Roman civilization. In Europe, among the Teutonic races, the stock-names (probably totemists in origin) survive in English local names. Our English ancestors had for personal names compound words, as "Noble Wolf" (Ethelwolf), "Wolf of War," and so forth, and these names certainly testify to a somewhat primitive and fierce stage of society. Then came more vulgar nicknames and personal descriptions, as "Long," "Brown," "White," and so forth. Other names are directly derived from the occupation or craft (Smith, Fowler, Sadler) of the man to whom they were given, and yet other names were derived from places. The noble and landowner was called "of" such and such a place (the German *von*, and French *de*), while the humbler man was called not "of" but "at" such a place, as in the name "Attewell," or merely by the local name without the particle. If we add to these patronymics formed by the addition of "son," and terms derived from Biblical characters (the latter adopted after the Reformation as a reaction against the names of saints in the calendar), we have almost exhausted the sources of modern English and European names.

NAMUR, a province of Belgium, is bounded on the

north by South Brabant, on the east by Liège and Luxembourg, on the south by France, and on the west by Hainault, having a maximum length from north to south of fifty-five miles; its greatest breadth is forty-five miles, and the area 1,413 square miles. The surface is much varied by hill and dale, being traversed by the forest of Ardennes, which here attains a height of about 2,100 feet; in some parts, especially in the valley of the Meuse between Dinant and Liège, the scenery is beautiful and romantic. The principal rivers are the Meuse and its tributary the Sambre, which joins it at Namur. Geologically the province belongs to the Carboniferous system; the iron mines are very rich, and along with the coal-pits employ a considerable proportion of the industry of the province. Lead mines are also worked to some extent; and building-stone, slate, and excellent marble are quarried. At the last census the population was 315,796. There are three arrondissements—Dinant, Namur, and Philippeville.

NAMUR (Flem., *Namen*), capital of the above province, is picturesquely situated on both banks of the Sambre, at the point of its junction with the Meuse, thirty-five miles southeast from Brussels. The population in 1889 was 27,068.

NANAK. See INDIA.

NANA SAHIB is the common designation of Dandhu Panth, adopted son of the ex-peshwa of the Mahrattas, Bâji Râo, who took a leading part in the great Indian mutiny, and was proclaimed peshwa by the mutineers. (See INDIA.) Nana Sahib was responsible for the massacres at Cawnpore, and was engaged in the protracted campaigns in Oudh. In the closing days of 1859, when the last remnants of the rebels disappeared over the Nepalese frontier, the Nana was among the fugitives. His death was reported some time afterward, but his real fate remains obscure.

NANCY, the ancient capital of Lorraine, afterward the chief town of the French department of Meurthe, and since 1872 that of the department of Meurthe-et-Moselle, is situated 219 miles east of Paris by railway, on the left bank of the Meurthe, six miles above its junction with the Moselle. It consists of two distinct portions: the old town in the northwest, between the citadel and the streets and square which bear the name of Stanislas, is composed of narrow and winding streets; the Stanislas town in the southeast has, on the other hand, wide, straight streets which cross each other at right angles and allow views of the hills around the city. Beyond the gates (several of which are preserved on account of their antiquarian interest, and still indicate the line of the old civic boundaries) long suburbs stretch out into the country. The railways from Paris to Strasburg skirt the city on the southwest side, and to the east and north lie the Meurthe and the canal from the Marne to the Rhine. Other railways—to Metz, to Epinal by Mirecourt, to Château Salins—join the main line in the neighborhood, and make the place an important junction.

Nancy is the seat of a bishop and of a court of appeal, and the headquarters of a military division dependent on the Châlons *corps d'armée*. It is also a university town, with the four faculties of medicine, literature, science, and law, and as an educational center has risen in importance since 1871. It possesses a large library, archives of antiquarian interest, a botanical garden and a museum of natural history, an academy, a geographical society, and an important school of forestry. The population was about 28,000 in the close of the eighteenth century, 43,000 in 1856, 52,000 in 1871, and 66,000 (73,225 as a commune) in 1881.

NANKING, or "the southern capital," is the name by which Keang-ning, the chief city in the province of

Keang-soo, in China, has been popularly known for several centuries. The present city dates only from the beginning of the Ming dynasty (1368), although it is built on the site of one which for more than two thousand years has figured under various names in the history of the empire. The more ancient city was originally known as Kin-ling; under the Han dynasty (206 B.C. to 25 A.D.) its name was converted into Tan-yang; by the T'ang emperors (618-907 A.D.) it was styled Keang-nan and Shing Chow; by the first sovereign of the Ming dynasty (1368-1644 A.D.) it was created the "southern capital" (Nan-king), and was given the distinctive name of Yang-t'een; and since the accession to power of the present Manchu rulers it has been officially known as Keang-ning, though still popularly called Nan-king.

But even when speaking of the city rebuilt by the Ming emperors it is necessary to use the past tense. The Taiping rebels, who carried the town by assault in 1853, made a clean sweep of all the national monuments and most of the more conspicuous public buildings it contained, and destroyed or were the means of destroying the greater part of the magnificent wall which surrounded it.

Nanking is about 194 geographical miles to the west of Shanghai, and is nearly equidistant between Canton and Peking. It is situated on the south bank of the Yangtze Keang, and has a population of 400,000 souls. In bygone days it was one of the chief literary centers of the empire, besides being famous for its manufacturing industries.

NANTES, a city of France, chief town of the department of Loire-Inférieure, is situated on the right bank of the Loire, thirty-five miles above its mouth. Its population (117,555) it is the first city of Brittany. At Nantes the Loire receives on the left hand the Sèvre Nantaise, and on the right the Erdre, which forms the outlet of the canal between Nantes and Brest; and a large number of bridges spanning the various branches of the different streams join the several quarters of the city. Along the left bank of the Loire stretches an ever-extending line of factories and shipbuilding yards. In all there are six miles of quays, two and one-half miles traversing the city in its greatest breadth from east to west along the main river. The largest vessels at present come no farther than St. Nazaire, but a canal is being made on the left bank which will allow vessels drawing sixteen feet to come up to the city. Nantes lies 264 miles west-southwest of Paris by the Angers and Le Mans Railway, and 40 miles from St. Nazaire. Other lines connect with Rennes *via* Châteaubriant, La Roche-sur-Yon, Paimbœuf, and Pornic.

The cathedral of Nantes, commenced in 1434 in the Gothic style, is still unfinished. Its length will be, when completed, 335 feet, and the nave is 85 feet wide and 123 feet in height. The towers are 205 feet high.

Between the cathedral and the Loire, from which it is separated only by the breadth of the quay, stands the castle of Nantes, founded in the ninth or tenth century. Nantes possesses a fine theater, a court-house, a prefecture, and an exchange, which includes both the tribunal and the chamber of commerce. Besides two great hospitals—St. Jacques on the left bank of the Loire, with 1,600 beds, and Hôtel-Dieu, recently rebuilt in Gloriette island, with 1,200 beds—Nantes contains a deafmute institute, a secondary school of medicine and pharmacy, a hydrographic school, a drawing school, a branch establishment of the conservatoire at Paris, and a lyceum. It is the see of a bishop, and the headquarters of the eleventh *corps d'armée*. As a seat of the sugar manufacture Nantes stands next to Paris and Marseilles. In city or suburbs there are vast establish-

ments for the manufacture of iron, copper, and lead, shipbuilding yards, factories for agricultural and similar implements, oil-works, soap-works, a national tobacco factory employing 1,800 hands, and stained-glass factory, manure works, and granite yards.

NANTEUIL, ROBERT, a crayonist, and one of the most eminent of French line engravers, was born about 1623, or, as other authorities state, in 1630, the son of a merchant of Rheims. He died in 1678.

NANTICOKE, a flourishing manufacturing borough of Luzerne county, Pa., is situated in the Wyoming valley, eight miles from Wilkesbarre, on the North Branch of the Susquehanna. Its chief production is anthracite coal, of which it ships a million tons a year. Its population grew from 4,000 in 1880 to 10,044 in 1890.

NANTUCKET, an island, county, and town of the United States, forming (since 1693) part of Massachusetts. The island, with an area of about fifty square miles, lies within the ten-fathom line, but is separated from the mainland by Nantucket Sound, which measures from twenty-five to thirty miles in breadth, and has a general depth of from five to eight fathoms. Within the harbor the depth at low water is about twelve or fourteen feet, but on the bar it is only six or seven.

Nantucket (Natocko on the map of 1630) was visited by Gosnold (1602), who found it covered with oaks and other trees, and inhabited by about 1,500 Indians. The town of Nantucket (known as Sherburne from 1673 to 1795) was incorporated in 1671; the original site was at Maddequet, five or six miles west of the present position, to which it was removed in the following year. About the same time whaling operations were commenced, and Nantucket gradually became the greatest whaling station in the world. But since the beginning of the century its prosperity has rapidly declined. The last full-blood Indian in Nantucket died in 1821; the last half-breed in 1854. The population of the county was 4,500 in 1775, 9,013 in 1840, 6,094 in 1860, 4,123 in 1870, and 3,727 in 1880.

NANTWICH, a market-town of Cheshire, England, situated on two railway lines and on both sides of the Weaver, twenty miles southeast of Chester and thirty-six south-southwest of Manchester. Population, 8,000.

NAPA, the capital of Napa county, Cal., about thirty miles from San Francisco, with which it is connected by railroad. It has two banks, manufactures of machinery, plows, and boots and shoes, and a population (1890) of 4,387.

NAPHTALI, the son of Jacob by Bilhah, Rachel's maid, and uterine brother of Dan. The narrator of Gen. xxx. 8 explains the name Naphtali by the verb niphtal "wrestle." The seats of the tribe lay in the eastern half of Upper Galilee, a fertile mountainous country sloping down to the headwaters of Jordan and the Sea of Galilee.

NAPHTHA, a word originally applied to the limpid liquid portion of the petroleum which exudes abundantly at Baku, etc., on the shores of the Caspian Sea. Both in commerce and in science the term is now used somewhat vaguely, but more in a generic sense, to embrace several bodies having certain properties in common, than as a specific name for a particular substance. Naphtha indeed has no distinct place or meaning in modern chemistry. By the alchemists the word was used principally to distinguish various highly volatile, mobile, and inflammable liquids, such as the ethers—sulphuric ether and acetic ether having been known respectively as *Naphtha sulphurici* and *Naphtha aceti*. In recent times naphtha has been employed to indicate the volatile, limpid, inflammable hydrocarbons obtained by destructive distillation of organic substances artificially conducted, as well as those produced by similar agencies

acting within the earth. In commerce the application of the term is still more restricted, and in general it embraces no more than the more volatile portion of the fluid hydrocarbons separated in the distillation of tar.

NAPHTHALINE. See **TAR**.

NAPIER, a seaport and borough of New Zealand, on the southeast coast of North Island, is the chief town of the province of Hawke's Bay, and is built on a peninsula (known as Scinde Island) about twelve miles from the southern end of the bay, about 200 miles by sea from Wellington. It is a thriving place, the center of a large agricultural and pastoral district. Population, 10,000.

NAPIER, SIR CHARLES, British admiral, was the second son of Captain the Hon. Charles Napier, R.N., and grandson of Francis, fifth Lord Napier, and thus cousin to the famous Napiers, Sir Charles, Sir George, and Sir William, and was born at Merchiston Hall, near Falkirk, on March 6, 1786. He became a midshipman in 1800, was promoted lieutenant in 1805, and commander in 1807, and distinguished himself in the West Indies, where he fought his famous action with three French ships of the line, and took the *Hautpoul*, seventy-four guns, into which the admiral promoted him captain. He spent some time at the university of Edinburgh, and then went to Portugal. In 1811 he served in the Mediterranean, and in 1813 on the coast of America and in the expedition up the Potomac. The first years of his leisure he spent in Italy and in Paris, but speculated so much in a steamboat enterprise that by 1829 he was quite ruined. In that year he was appointed to the *Galatea*, forty-two, and was at the Azores when they were held by the Count de Villa Flor for the queen of Portugal. He so much impressed the constitutional leaders that they begged him to take command of the fleet, which offer he accepted in February, 1833. With it he destroyed the Miguelite fleet off Cape St. Vincent on July 5, and on the demand of France was struck off the English navy list. Continuing his Portuguese services, he commanded the land forces in the successful defense of Lisbon in 1834, when he was made Grand Commander of the Tower and Sword, and Count Cape St. Vincent in the peerage of Portugal. On his return to England he was restored to his former rank in the navy in 1836, and received command of the *Powerful* in 1838. When troubles broke out in Syria he was appointed second in command, and distinguished himself by leading the storming column at Sidon on September 26, 1840, and by other services, for which he was made a K.C.B. He was promoted rear-admiral in 1846, and commanded the channel fleet from 1846 to 1848. On the outbreak of the Russian War he received the command of the fleet destined to act in the Baltic, but refused to attack Cronstadt. He was elected M.P. for Southwark in February, 1855, and retained his seat, though broken in health, until his death on November 6, 1860.

NAPIER, SIR CHARLES JAMES, was born at Whitehall, London, in 1782. After the custom of those times Charles Napier had been gazetted an ensign in the 33d regiment in 1794, and in 1797 his father secured for him the appointment of aide-de-camp to Sir James Duff, the general commanding the Limerick district. Moore speedily perceived the military qualities of the Napiers, and inspired the three elder brothers—Charles, George, and William—with an enthusiasm which lasted all their lives. Shortly after his return from Denmark the 50th was ordered to Portugal, and shared all the glories of the famous retreat to Coruña. Napier's life was saved by a French drummer named Guibert, who brought him safely to the headquarters of Marshal Soult. Soult treated him with the greatest kindness; and he was allowed by Ney to return to England to his "old blind mother" instead of being interned.

He had not been long in England when he heard that his exchange had been arranged, and, volunteering for the Peninsula, he joined the light division before Ciudad Rodrigo. As a volunteer he served in the actions on the Coa, and again at Busaco, where he was badly wounded. He was ordered to England, but refused to go, and was present with the light division in all the actions which took place during Wellington's pursuit of Maséna. His services were rewarded soon after by the lieutenant-colonelcy of the 102d regiment. He accompanied it in June, 1812, from Guernsey to Bermuda, where he wrought a wonderful change in the spirit of both officers and men. In September, 1813, he exchanged back into the 50th regiment, and in December, 1814, believing all chance of active service to be at an end, retired on half-pay. He was gazetted one of the first C.B.'s on the extension of the order in 1814, and was present as a volunteer at the capture of Cambray, though he just missed the great battle of Waterloo. Though an officer of some experience and more than thirty years of age, he now joined the military college at Farnham, and completed his military education. In 1819 he was appointed inspecting field officer at Corfu. From Corfu he was moved in 1822 to Cephalonia, where he remained for eight years as governor and military resident. An interesting episode in his command was his communication with Lord Byron when he touched at Cephalonia on his way to his death at Missolonghi, and the insurrection of the Greeks, who would have called him to be their commander-in-chief had the Greek committee in London encouraged his pretensions. In 1834 he refused the governorship of Australia, still hoping for military employment. In 1837 he was promoted major-general with his brother George, and in 1838 was made a K.C.B.; but he was to wait till 1839 before he received an offer of employment. In 1841 he resigned his command and went to India. He was stationed at Poona, and in September, 1842, when troubles were expected there, was ordered to Sind.

His command in Sind from 1842 till August, 1847, is the period of his life during which, according to his brother, he made good his title to fame, but his acts, more especially at first, have been most severely criticised. In fact there can be little doubt that from the moment he landed in the province he determined to conquer the ameers, and to seek the first opportunity of doing so. He was to be accompanied by Colonel Outram, who had been resident in Sind during the Afghan war, and who felt a great admiration for him, but who had also a warm affection for the ameers, and believed that he could put off the day of their destruction. On February 17, 1843, while Outram was still absent engaged in negotiation, Napier attacked the Baluch army 30,000 strong with but 2,800 men. With these 2,800 men, including the 22d regiment, which would do anything for him, he succeeded in winning the victory of Meanee. It was a battle of the olden type, in which generals had to fight like privates. Sir Charles was in his element, and himself engaged in the fray. In the March following he finally destroyed the army of the ameers at the battle of Hyderabad. His success was received with enthusiasm both by the governor-general, Lord Ellenborough, and by the English people, and he was at once made a G.C.B. The conqueror of Sind now had an opportunity to prove his administrative powers, and proceeded to apply the same material means of civilization to Sind which had formerly been successful in Cephalonia. Whether or not the conquest of Sind at that particular period can be justified, there can be no doubt that Charles Napier was the best administrator who could be found for the province

when conquered. The later years of his administration were made very stormy by the attacks on the policy of the conquest which had been made in England. He left Sind, after quarreling with every authority of the presidency of Bombay, and nearly every authority of the whole of India, in August, 1847, and received a perfect ovation on his return from all the hero-worshippers of the Napiers, of whom there were many in England. His short stay in England was occupied with incessant struggles with the directors of the East India Company; but, however much the directors hated him, it was not long before they had to beseech him in humble terms to become their commander-in-chief. The news of the indecisive victory of Chillianwalla created a panic in England, and the East India Company was obliged by the force of public opinion to summon Napier to take the command of its armies. Sir Charles started almost at a moment's notice, but on reaching India found that the victory of Gujrat had been won and the Sikh war was over. No taint of envy was in his nature, and he rejoiced that he had not to supersede Lord Gough in the moment of defeat. His restless and imperious spirit was met by one equally imperious in the governor-general, Lord Dalhousie. From the very beginning of his command the governor-general and the commander-in-chief disagreed, and in April, 1850, Sir Charles was reprimanded on some trifling point of discipline. The reprimand was reiterated by the duke of Wellington, and in December, 1850, Napier once more left for England. His constitution was undermined by the Indian climate, and especially by his fatiguing command in Sind, and on August 29, 1853, he died at Portsmouth.

NAPIER, JOHN, the inventor of logarithms, was born at Merchiston, near Edinburgh, in 1550, and was the eighth Napier of Merchiston. He died in 1617.

NAPIER, SIR WILLIAM FRANCIS PATRICK, was born at Cellbridge, near Dublin, on December 17, 1785. He became an ensign in the Royal Irish Artillery in 1800. He served in Denmark, and was present at the engagement of Kioge, and, his regiment being shortly afterward sent to Spain, he bore himself nobly through the retreat to Coruña. In 1809 he became aide-de-camp to his uncle in Ireland, but joined the 43d when ordered again to Spain. He was wounded on the Coa, and shot near the spine at Casal Nova. His conduct was so conspicuous during the pursuit of Masséna after he left the lines of Torres Vedras that he as well as his brother George was recommended for a brevet majority. He served with his regiment at the battles of the Nive, Orthes, and Toulouse. For his services he was made brevet lieutenant-colonel, and one of the first C.B.'s. Like his brother Charles he then entered the military college at Farnham. He commanded his regiment in the army of occupation in France until 1819, when he retired on half-pay. As it was impossible for him to live on his half-pay with a wife and family, he determined to become an artist, and took a house in Sloane street, where he studied with George Jones, the academician. The years he had spent in France he had occupied in improving his general education, for it will hardly be believed that the author of the *History of the War in the Peninsula* could not spell or write respectable English till that time. But his career was to be great in literature, not in art. The tendency appeared in an able review of Jomini in 1821, and in 1823 Mr. Bickersteth, afterward Lord Langdale, suggested to him the expediency of writing a history of the Peninsular War, in which he bore a part. In 1828 the first volume of the *History* appeared, and it was at once seen that the great deeds of that war were about to be fitly commemorated.

This success was due to a combination of qualities which have justly secured for Napier the title of being the best military historian England has produced. The best military histories have always been written by eye-witnesses. It is impossible for a new generation to analyze the military combinations and understand the minute facts which account for the winning or losing of a battle, though it may often unravel political intrigues which were veiled to the eyes of contemporaries. Napier added to this qualification a wonderful insight into the nature of war, and was alike to describe and understand the movements and feelings of the French as well as of the army in which he himself served. His admiration for Napoleon was only second to that for Sir John Moore, and he could feel for Soult in defeat as well as for Wellington in the hour of victory. When, in 1840, the last volume of the *History* was published, his fame not only in England but in France and Germany was safely established. In 1842 he was promoted major-general, and had given him the lieutenant-governorship of Guernsey. In 1845 he published his *History of the Conquest of Scinde*, and 1851 the corresponding *History of the Administration of Scinde*—books which in style and vigor rivaled the great *History*, but which, being written for controversial purposes, are not likely to maintain such an enduring popularity. He died in 1860.

NAPLES (Ital. *Napoli*, Gr. and Lat. *Neapolis*), formerly the capital of the kingdom of the Two Sicilies, and since 1860 the chief town of a province in the kingdom of Italy, is the largest and most populous city in the country, and disputes with Constantinople the claim of occupying the most beautiful site in Europe. It is situated on the northern shore of the Bay of Naples. It is distant 161 miles from Rome.

No other place in the world combines within the same compass so much natural beauty with so many objects of interest to the antiquary, the historian, and the geologist, as the Bay of Naples. It affords good anchorage, with nearly seven fathoms water, and is well sheltered, except from winds which blow from points between southeast and southwest.

On the northeast shore of the bay, east of Naples, is an extensive flat, forming part of the ancient *Campania Felix*, and watered by the small stream Sebeto and by the Sarno, which formerly flowed by Pompeii. From this flat, between the sea and the range of the Apennines, rises Vesuvius, at the base of which, on or near the sea-shore, are the town-like villages of San Giovanni Teduccio, Portici, Resina, Torre del Greco, Torre dell' Annunziata, etc., and the classic sites of Herculaneum and Pompeii. At the southeast extremity of the plain, three miles beyond the outlet of the Sarno, a great offshoot of the Apennines, branching from the main range near Cava, and projecting as a peninsula more than twelve miles west, divides the Bay of Naples from the Bay of Salerno, and ends in the bold promontory of the Punta della Campanella, which is separated by a strait of four miles from Capri. On the north slope of this peninsula, where the plain ends and the coast abruptly bends to the west, stands the town of Castellammare, near the site of *Stabia*, at the foot of Monte Sant' Angelo, which rises suddenly from the sea to a height of 4,722 feet. Farther west, and nearly opposite to Naples across the bay, are Vico, Meta, Sorrento, Massa, and many villages.

The city of Naples is built at the base and on the slopes of a range of volcanic hills, and, rising from the shore like an amphitheater, is seen to best advantage from the water. From the summit occupied by the castle of St. Elmo a transverse ridge runs south to form the promontory of Pizzofalcone.

The streets of Naples are generally well paved with lava or volcanic basalt, which, however, renders them both noisy and slippery for horses. The castle of St. Elmo, which dominates the whole city, had its origin in a fort erected by King Robert the Wise in 1343. The present building, with its rock-hewn fosses and massive ramparts, was constructed by Don Pedro de Toledo at the command of Charles V. in 1535, and was long considered practically impregnable. Damaged by lightning in 1857, it was afterward restored, but it is no longer used for defensive purposes. On a small island (I. del Salvatore, the *Megarís* of Pliny) now joined to the shore at the foot of the Pizzofalcone by an arch-supported causeway 800 feet long, stands the Castel dell' Ovo, which, dating from 1154, was for several centuries a place of great strength. Castel Nuovo, a very picturesque building constructed near the harbor in 1283 by Charles I. of Anjou, contains between the round towers of its façade the triumphal arch erected in 1470 to Alphonso I., and numbers among its chambers the Gothic hall of Giovanni Pisano in which Celestine V. abdicated the papal dignity. The royal palace, begun in 1600 by the Count de Lemos, from designs by Domenico Fontana, partly burned in 1837, and since repaired and enlarged by Ferdinand II., is an enormous building with a sea frontage of 800 feet, and a main façade 554 feet long and 95 feet high, exhibiting the Doric, Ionic, and Composite orders in its three stories. Naples is the see of a Roman Catholic archbishop, always a cardinal. The cathedral has a chapter of thirty canons, and of the numerous religious houses formerly existing thirteen have in whole or in part survived the suppression in 1868. The city is divided into 47 parishes, and there are 257 Roman Catholic churches and 57 chapels. Most of the churches are remarkable rather for richness of internal decoration than for architectural beauty. The cathedral of St. Januarius, occupying the site of temples of Apollo and Neptune, and still containing some of their original granite columns, was designed by Nicola Pisano, and erected between 1272 and 1316.

Of all the secular institutions in Naples none is more remarkable than the national museum, better known as the Museo Borbonico. The building, begun in 1586 for cavalry barracks, and remodeled in 1615 for the university, received its present destination in 1790. Enriched by the Farnese collection, by all that was most valuable in Naples, and by everything that would bear removal from Herculaneum, Pompeii, Stabiae, Puteoli, Pæstum, etc., the museum is unique as a treasure-house of Roman and early Italian antiquities. The collection of Etruscan and Italo-Greek vases is unsurpassed. Nor is the variety of objects greater than the artistic value of some of the items—such as the Farnese Hercules, the Farnese Bull (Amphion and Zetus binding Dirce to its horns), the Dancing Faun (bronze), the statues of the Balbi (marble). For the rich libraries of Naples, see LIBRARY. The Club Alpino has a unique collection (25,000 volumes) of Vesuvian and seismographical literature.

The university of Naples is one of the oldest in Italy, having been founded by Frederick II. in the first half of the thirteenth century. It had fallen to insignificance under the Bourbons, but since 1860 it has rapidly recovered.

There are about a score of theaters in Naples. The San Carlo opera-house, with its area of 5,157 square yards, and its pit capable of containing 1,000 spectators, is one of the largest in Europe.

The port of Naples is second in the kingdom. The total tonnage of foreign and coasting trade (entrance and clearance) had increased from 1,812,138 register tons in 1863 to 4,128,057 in 1882.

Naples has several good local springs (notably the Aqua del Leone at Margellina), a covered channel brings the waters of Monte Somma (Vesuvius) to the lower parts of the town; an aqueduct constructed in the seventeenth century at the cost of Criminello and Carmignano, taps the Isclero at Sant' Agata dei Goti, thirty miles distant; and a number of artesian wells have proved successful as far as quantity is concerned. But in spite of all these resources the water supply has long been far below the demand; and a city, which from its position might be one of the best-drained, cleanest, and healthiest in the world, has had an unenviable reputation for dirtiness and unwholesomeness. At present extensive works are in progress by which good drinking water is to be brought from Serino (nearly fifty miles distant) and laid on at three different high levels at the rate of 22,000,000 gallons daily for the use of the inhabitants and 1,000,000 for public purposes.

Naples, the most densely populated city in Europe, is slowly but steadily increasing. The commune—which includes not only the urban districts of S. Ferdinand, Chiaja, S. Giuseppe, Monte Calvario, Avvocata, Stella, San Carlo all' Arena, Vicaria, S. Lorenzo, Mercato, Pendino, and Porto, but also the suburban districts of Vomero, Posillipo, Fuorigrotta, Miano-Mianella, and Piscinola-Marianella—has advanced from 404,000 inhabitants in 1788 to 493,115 in 1881, and the city proper (the first twelve districts) from 326,130 in 1812 to 461,962 in 1881.

All ancient writers agree in representing Naples as a Greek settlement, though its foundation is obscurely and differently narrated. It seems that the oldest city on its site was founded by a colony from the neighboring Greek town of Cumæ. They are said to have given it the name of *Parthenope*, from a legendary connection of the locality with the siren Parthenope, whose tomb was still shown at the time of Strabo. A number of Chalcidic and Athenian colonists are reported to have afterward joined the original settlers, and to have built for themselves separate dwellings, which they called *Neapolis*, or the new city, in contradistinction to the old settlement, which in consequence was styled *Palæopolis*, or the old city. All modern attempts to define the respective extent and situation of Palæopolis and Neapolis have failed; but Livy's testimony leaves no doubt that they were close to each other and identical in language and government.

NAPOLEON I. The family Bonaparte (written by Napoleon's father and by himself down to 1796 Buonaparte, though the other spelling occurs in early Italian documents) was of Tuscan origin. A branch of it was settled in Corsica at least as early as the sixteenth century, from which time the Bonapartes appear as influential citizens of Ajaccio. They had an ancient title of nobility from the Genoese republic, and Napoleon's grandfather obtained letters of nobility also from the grand-duke of Tuscany. They had, therefore, the right to sign De Buonaparte, but ordinarily dropped the preposition of honor. Charles Marie de Buonaparte (born in 1746), studied law at the university of Pisa, where he took his doctor's degree in 1769, married at the age of eighteen Letitia Ramolino, who was not quite fifteen. The lady had beauty, but apparently neither rank nor wealth. Thirteen children were born, of whom eight grew up. The list is as follows: Joseph (king, first of Naples, then of Spain), Napoleon, Lucien, Eliza (Princess Bacciochi), Pauline (married, first to General Leclerc, afterward to Prince Borghese), Caroline (married to Murat, became queen of Naples), Louis (king of Holland), Jerome (king of Westphalia). Of these the eldest was born in 1768, the youngest in 1784. (See BONAPARTE.)

Besides his brothers and sisters, Napoleon raised to importance Joseph Fesch, half-brother of his mother, a Swiss on the father's side, who was afterward known to the world as Cardinal Fesch.

* The accepted opinion is that Napoleon was born at Ajaccio on August 15, 1769. This opinion rests indeed on the positive statement of Joseph Bonaparte, but it is certain from documents that on January 7, 1768, Madame Letitia bore a son at Corte, who was baptized by the name of Nabulione. And even in legal documents we find contradictory statements about the time and place of birth, not only of Napoleon, but also of Joseph. All difficulties disappear at once if we suppose that Napoleon and Nabulione were one and the same, and that Joseph was really the second son, whom the parents found it convenient to pass off as the first-born. This they may have found convenient when, in 1779, they gained admission for a son to the military school of Brienne. A son born in 1768 would at that date be inadmissible, as being above ten years of age. Thus it is conceivable that Napoleon was introduced by a fraud to that military career which changed the face of the world. Nevertheless it is certain from Lucien's memoir that of such a fraud nothing was known to the younger members of the family, who regarded Joseph as without doubt the eldest.

After passing two or three months in a school at Autun for the purpose of learning French—he had hitherto been a thorough Italian—Napoleon entered Brienne on April 23, 1779, where he remained for more than five years, and then in September, 1784, passed, as "cadet-gentilhomme," into the military school of Paris. In the next year, 1785, he obtained his commission of lieutenant in the regiment La Fère, stationed at Valence. He had already lost his father, who, undertaking a journey to France on business, was entertained at Montpellier in the house of an old Corsican friend, Madame Permon, mother of the celebrated memoir-writer Madame Junot, and died there of the disease which was afterward fatal to Napoleon, on February 25, 1785, at the age of thirty-eight years.

The fact principally to be noticed about Napoleon's extraction and boyhood is that he was by birth a noble, needy provincial, and that from his tenth year his education was exclusively military. Of all the great rulers of the world none has been by breeding so purely a military specialist. He could scarcely remember the time when he was not a soldier living among soldiers. The effects of this training showed themselves too evidently when he had risen to the head of affairs. His character declared itself earlier than his talents. His abilities do not seem to have excited wonder, but he was studious, and in mathematics and geography made great progress. He never, however, so Carnot tells us, became a truly scientific man. He had neither taste nor talent for grammatical studies, but he was fond of books, and books of a solid kind.

He became a lieutenant of artillery in the service of Louis XVI. The next years were spent mainly with his regiment at Valence, Lyons, Douai, Paris, Auxonne, Seurre, Auxonne again. But he took long holidays with his family at Ajaccio, obtaining permission on the ground of ill-health. During this period he was principally engaged in authorship, being consumed by the desire of distinction, and having as yet no other means of attaining it. He produced *Letters on the History of Corsica*, which he proposed to dedicate first to Paoli, afterward to Raynal. Among his smaller compositions was *The Narrative of the Masked Prophet*.

Meanwhile his active life had begun with the Revolution of 1789. The first chapter of it is separate from the rest, and leads to nothing. That astonishing

career which has all the unity of a most thrilling drama does not begin till 1795. The six years which preceded it may be called his Corsican period, because for the greater part of it he may be thought to have regarded Corsica as the destined scene of his future life. In 1789 the Italian island of Corsica had been for twenty years a dependency of France. But France had acquired it in a most unscrupulous manner by purchasing the rights of the republic of Genoa over it. She did this in 1768, when Corsica had contested those rights in a war of nearly forty years, and had been practically independent for thirteen years under the dictatorship of Pasquale Paoli. It was an act similar to the partition of Poland, and seems to mark a design on the part of France—which had just lost its American colonies—to extend its power by way of the Mediterranean into the East. Paoli was compelled to take refuge in England, where he was still living when the French Revolution broke out.

The Revolution was as dangerous an event to the relation between France and Corsica as to that between France and St. Domingo. The islanders and the exiled Paoli at their head took a moderate view. France must guarantee a good deal of local freedom; on such conditions, they thought, the relations might continue, if only to prevent the republic of Genoa from reviving its pretensions. Accordingly, on November 30, 1789, Corsica was declared by the National Assembly to be a province of France, and the protest against this decree made by Genoa was treated with contempt. Paoli left London, was received in France with an ovation, appeared before the National Assembly on April 22, 1790, and landed in Corsica July 14th, after an absence of twenty-one years. Thus was Corsica reconciled to France by the Revolution of 1789; but the good work was undone by the Second Revolution of 1792.

Since 1769 the French power in the island had rested mainly on the noblesse and clergy. The Bonaparte family, as noble, had been on the unpatriotic side. It is therefore a remarkable fact that almost immediately after the taking of the Bastille Napoleon hurried to Ajaccio and placed himself at the head of the revolutionary party. He devoted himself to the establishment of a National Guard, of which he might hope to be the La Fayette, and he published a letter to Buttafuoco which, properly understood, is a solemn desertion of the principles of his family, similar to that of Mirabeau. This letter has also the intensity of his other early writings, but far more effectiveness. Had the opportunity offered, he might no doubt have stood forth at this time as the liberator of Corsica; but circumstances did not prove favorable, and he drifted gradually in the opposite direction.

In October, 1790, he met Paoli at Orezza, where Corsica constituted itself as a French department, Paoli being president. Paoli is said to have hailed Napoleon as "one of Plutarch's men." As the only Corsican officer trained at a royal military school, Napoleon might aspire to become commander of a paid native guard which it was proposed to create for the island. But France had misgivings about the use to which such a guard might be put, and the minister of war rejected the proposal. In the next year, however, he was successful in a second attempt to get the command of an armed force in Corsica, and betrayed in the course of this attempt how much more intent he was at this time upon Corsican than upon French affairs. It was decided to create four battalions of national volunteers for Corsica, and Napoleon became candidate for the post of lieutenant-colonel in the district of Ajaccio. The choice was in the hands of the volunteers themselves, and in

pursuing his canvass Napoleon did not hesitate to outstay his furlough, and thus forfeit his French commission by willful absence from a great review of the whole French army which was appointed for the opening day of 1792. He was, however, elected, having, it is said, executed the first of his many *coups d'état* by violently imprisoning a commissioner sent down to superintend the election.

He went to Paris, where he arrived on May 21st. The Second Revolution was at hand, and he could observe while no one had leisure to observe him. He witnessed August 10th and the downfall of the monarchy. On August 30th his name was restored to the army list with the rank of captain, a commission dated back to February 6th, and arrears of pay. He was saved from the most desperate condition to which he was ever in his whole life reduced. On September 2d he engaged in withdrawing his sister Eliza from St. Cyr (the House of St. Louis having been suppressed). The next step he took was remarkable. The great war which was to carry him to the pinnacle of fame was now in full progress. By undeserved good luck his military rank was restored to him. Now, instead of joining his regiment, he set off for Ajaccio, where he arrived on the 17th. The winter was spent in the unsuccessful expedition, which may be called Napoleon's first campaign, made from Corsica against the island of Sardinia. On his return he found a new scene opened. The Second Revolution was beginning to produce its effect in Corsica, which was no mere province of France, and in which everything was modified by the presence of Paoli. It might have been expected that Bonaparte, who all his life had glorified Paoli, and whose early letters are full of hatred to France, would have been an enthusiastic Paolist. But a breach seems to have taken place between them soon after Napoleon's return from Paris, perhaps in consequence of his escapade of Easter, 1792. The crisis came on April 2d, when Paoli was denounced before the Convention, among others by Marat, and it was decreed that he and Pozzo di Borgo should come to Paris and render an account of their conduct to the Convention. Paoli refused, but with the remarkable moderation which characterized him offered to leave Corsica if his presence there appeared to the Convention undesirable. But the islanders rallied round him almost as one man.

There could be no reason why the horrors of the Second Revolution should extend to Corsica, even if we consider them to have been inevitable in France. For a Corsican patriot no fairer opportunity could offer of dissolving with universal approbation the connection with France which had begun in 1769. Napoleon took the opposite side. He stood out with Salicetti as the leading champion of the French connection and the bitterest opponent of Paoli. Paoli summoned a national consulta at the end of May, and the dissolution of the French connection now began. The consulta denounced the Bonaparte family by name. Napoleon answered by desperate attempts to execute his old plan of getting possession of the citadel of Ajaccio. But he failed, and the whole Bonaparte family, with Madame Letitia and Fesch, pursued by the fury of the people, took refuge in France. With this hejira the first period of Napoleon comes to an end.

It was in June, 1793, that the Bonaparte family found themselves at Toulon in the midst of the Corsican emigration. France was in a condition not less disturbed than Corsica, for it was the moment of the fall of the Girondins. Plunged into this new party strife, Bonaparte could hardly avoid taking the side of the Mountain. Paoli had been in a manner the Girondin of Corsica, and Bonaparte had headed the opposition to him.

Marseilles had declared against the Convention, and had sent an army under Rousselet which had occupied Avignon, but had evacuated it speedily on being attacked by the troops of the Mountain under Carteaux. Bonaparte took part in the attack, commanding the artillery, but it seems an unfounded statement that he specially distinguished himself.

Bonaparte marched with Carteaux into Marseilles late in August, and about the same time Toulon delivered itself into the hands of the English. Just at this moment he was promoted to the rank of *chef de bataillon* in the second regiment of artillery, which gave him practically the command of the artillery in the force which was now formed to besiege Toulon. The story of his relations with the generals who were sent successively to conduct the siege, Carteaux the painter, Doppet the physician, Dugommier the brave veteran, and of his discovery of the true way to take Toulon, are perhaps somewhat legendary, but he may probably have been eloquent and persuasive at the council of war held November 25th, in which the plan of siege was laid down. That he distinguished himself in action is more certain, for Dugommier writes, "Among those who distinguished themselves most, and who most aided me to rally the troops and push them forward, are citizens Buona Parte, commanding the artillery, Arena and Cervoni, adjutants general." He was now named general of brigade.

Bonaparte now passed out of the civil into the foreign war. The military system of the Convention was by this time in full operation. Distinct armies faced each enemy, and the great military names of the Revolution were already in men's mouths. Bonaparte joined the army of Italy as general of artillery and inspector-general; to the same army was attached Masséna as general of division; Dumerbion was general-in-chief. It is then that for the first time Bonaparte's exceptional ability was remarked. In the brief campaign of the army of Italy which occupied the month of July, 1794, he took no part, while Masséna commanded in the illness of Dumerbion. But in July he made his first essay in diplomacy. Genoa was among the earliest of the many feeble neutral states which suffered in the conflict of the Revolution with the great powers, and at the expense of which the revolutionary empire was founded. Bonaparte was sent by the younger Robespierre to remonstrate with the Genoese Government upon the use which they suffered the Coalition to make of their neutral territory. He was in Genoa from July 16th to July 23d; he urged the French claim with success; he returned to Nice on July 28th. Probably the connection of Bonaparte with the Robespierres was closer than Bonaparte himself at a later time liked to have it thought. Accordingly after Thermidor the Representatives who remained with the army of Italy, viz., Salicetti, Albitte, and Laporte, suspended Bonaparte from his functions, and placed him provisionally under arrest (August 6th). He was imprisoned at the Fort Carré near Antibes, but fortunately for him was not sent to Paris. On the 20th he was set provisionally at liberty on the ground of "the possible utility of the military and local knowledge of the said Bonaparte."

His escape was due, according to Marmont, to Salicetti's favor and to the powerful help he himself succeeded in procuring; "he moved heaven and earth." His power of attaching followers also now began to appear; Junot and Marmont, who had become acquainted with him at Toulon, were prepared, if he had been sent to Paris, to set him free by killing the *gens d'armes* and carrying him into the Genoese territory. This was a passing check; early in 1795 he suffered a greater misfortune. He had been engaged in a maritime expedition

of which the object was to recover Corsica, now completely in the power of the English. On March 3d he embarked with his brother Louis, Marmont, and others on the brig *Amitié*. On the 11th the fleet set sail. It fell in with the English, lost two ships, and returned defeated. The enterprise was abandoned, and by the end of the same month we find Lacombe Saint Michel, member of the Committee of Public Safety, sending orders to the general of brigade Bonaparte to proceed immediately to the army of the west in order to take command of the artillery there. He left Marseilles for Paris on May 5th.

On his arrival at Paris he avoided proceeding to the army of the west, and after a time obtained from Doucet de Pontécoulant a post in the topographical section of the war office. Here he had an opportunity of resuming his old work, and we find him furnishing Doucet, as he had before furnished Robespierre junior, with strategical plans for the conduct of the war in Italy. Late in August he applied for a commission from Government to go to Constantinople at the head of a party of artillerymen in order to reform that department of the Turkish service. At this moment occurs the crisis of his life. It coincided with a remarkable crisis in the history of France.

The Second Revolution (1792) had destroyed the monarchy, but a republic, properly speaking, had not yet been established. Between 1792 and 1795 the government had been provisionally in the hands of the National Convention, which had been summoned, not to govern, but to create a new constitution. Now at length, the danger from foreign enemies having been averted, the Convention could proceed to its proper work of establishing a definite republic.

There was danger lest the country, when appealed to, should elect to undo the work of 1792 by recalling the Bourbons, or at least should avenge on the Mountain the atrocities of the Terror. To preserve the continuity of government an expedient was adopted. As under the new constitution the assemblies were to be renewed periodically to the extent only of one-third at a time, it was decreed that the existing Convention should be treated as the first Corps Législatif under the new system. Thus, instead of being dissolved and making way for new assemblies, it was to form the nucleus of the new legislature, and to be renewed only to the extent of one-third. This additional law, which was promulgated along with the new constitution, excited a rebellion in Paris. The sections (or wards) called into existence a revolutionary assembly, which met at the Odéon. This the Convention suppressed by military force, and the discontent of the individual sections was thereby increased. At the same time their confidence was heightened by a check they inflicted upon General Menou, who, in attempting to disarm the section Lepelletier, was imprisoned in the Rue Vivienne, and could only extricate himself by concluding a sort of capitulation with the insurgents. Thereupon the Convention, alarmed, put Menou under arrest, and gave the command of the armed forces of Paris and of the army of the interior to Barras, a leading politician of the day, who had acquired a sort of military reputation. Barras knew the army of Italy and the services which Bonaparte had rendered at Toulon, and nominated him second in command.

It does not seem that Bonaparte showed any remarkable firmness of character or originality of genius in meeting the revolt of the sections on the next day (Vendémiaire 13th, *i.e.*, October 5th) with grapeshot. The disgrace of Menou was a warning that the Convention required decisive action, and the invidiousness of the act fell upon Barras, not upon Bonaparte. Indeed in the

official report drawn by Bonaparte himself his own name scarcely appears; instead of assuming courageously the responsibility of the deed, he took great pains to shirk it. He appeared in the matter merely as the instrument, as the skillful artilleryman, by whom Barras and the Convention carried their resolute policy into effect. In this affair he produced an impression of real military capacity among the leading men of France, and placed Barras himself under a personal obligation. He was rewarded by being appointed in succession to Barras, commander of the army of the interior. In this position, political and military at the same time, he preluded to the part reserved to him later of First Consul and Emperor. He also strengthened his new position materially by his marriage with Josephine de Beauharnais, née Tascher. Josephine was prominent in Parisian society, and for the lonely Corsican, so completely without connections in Paris, or even in France, such an alliance was of priceless value. The act of marriage is dated Ventôse 19, year IV. (*i.e.*, March 9, 1796). On this day Bonaparte had already been appointed to the command of the army of Italy. His great European career now began.

The fourth year of the Revolutionary War was opening. The peculiar characteristic of that war is that, having been for France, at the commencement, a national war of liberation on the grandest scale, it changed its character after two years and became an equally unprecedented national war of conquest. The conquest of Austrian Flanders had been made in 1794, that of Holland in the winter of the same year. The whole left bank of the Rhine was in French occupation, and the war had passed over to the right bank. The question was no longer of the principles of the Revolution, but only of inducing the emperor and the Germanic body to conclude treaties in which Belgium and the left bank should be ceded. Prussia, with most of the North-German princes and Spain, had retired from the war early in 1795. Austria was now the great enemy of France by land. Accordingly the direct struggle was waged chiefly on the upper Rhine, where Austria had then extensive territories.

But not only Austria could be attacked in Italy. The French Revolution, by undertaking a sort of crusade against monarchy, had furnished itself with a justification for attacking almost all states alike, for almost all were either monarchical or at least aristocratic. Italy was full of small states which could be attacked as Mainz or Holland had been attacked before. Bonaparte instinctively saw that he had a charter for indiscriminate conquest and plunder. He announced this to the army without the least disguise: "Soldiers, you are naked and ill fed; I will lead you into the most fruitful plains in the world. Rich provinces, great cities will be in your power. There you will find honor and fame and wealth!"

This order of the day was issued from Nice, where Bonaparte had arrived on March 27th. The campaign began on April 10th. This, the first of Bonaparte's campaigns, has been compared to his last. As in 1815 he tried to separate Blücher and Wellington, hoping to overcome them in turn, so now with more success he attacked first the Austrians under Beaulieu and then the Sardinians under Colli. Defeating the Austrians at Montenotte, Millesimo, and Dego, he turned on the 15th against Colli, defeated him at Ceva, then at Mondovì, and concluded the convention at Cherasco on the 28th. By this convention, which was soon after turned into a treaty of peace, Sardinia was severed from the Coalition, and her principal fortresses put into the hands of France. What Bonaparte had so long dreamed of he accomplished in a single month, and turned himself at once to the conquest of Lombardy.

The month of May was devoted to the invasion. On the 7th he crossed the Po at Piacenza, stormed the bridge over the Adda at Lodi on the 11th, and, as the archduke who governed Lombardy had quitted Milan on the 9th, retiring by Bergamo into Germany, Bonaparte entered Milan on the 15th. That day Bonaparte told Marmont that his success hitherto was nothing to what was reserved for him. June was spent in consolidating the conquest of Lombardy, in spoiling the country, and repressing the insurrections which broke out among the Italians, astonished to find themselves plundered by their "liberators." From the middle of July the war, as far as Austria was concerned, became a war for Mantua. Austria made desperate and repeated efforts to raise the siege of that all-important fortress. On July 29th Würmser arrived at the head of 50,000 men, making his way through Tyrol from the Rhine. He advanced on both sides of the Lake of Garda, and threatened Bonaparte's communications by occupying Brescia. Bonaparte abandoned the siege of Mantua, and brought his whole force to meet the enemy.

At the end of October Austria had assembled a new army of 50,000 men. They were placed under the command of Alvinzi. Bonaparte was to be overwhelmed between this army and that of Würmser issuing from Mantua. But by a night march he fell upon Alvinzi's rear at Arcola. The struggle lasted through three days, during which Bonaparte's life was at one moment in great danger, and ended in complete victory for the French (November 15-17). From Arcola he used ever afterward to date his profound confidence in his own fortune.

The commander of a victorious army wields a force which only a government long and firmly established can hold in check. A new government, such as the Directory in France, having no root in the country, is powerless before a young victor such as Bonaparte. The danger had been early perceived; Hoche had been pronounced dangerous by Robespierre; it became imminent when Bonaparte with his unrestrained ambition pushed before the other generals. The *coup d'état* of Brumaire was in Bonaparte's mind before he had been many weeks at the head of the army of Italy. But long before he ventured to strike the existing government we see that he had completely emancipated himself from it, and that his acts were those of an independent ruler, as had been those of Cæsar in Gaul or of Pompey in the East while the Roman republic was still nominally standing.

From the outset it had been contemplated to make the invasion of Italy financially profitable. Contributions were levied so rapaciously that in the duchy of Milan, where the French had professed to appear as brothers and liberators, a rebellion against them speedily broke out, which Bonaparte suppressed with the merciless cruelty he always showed in such cases. He kept the promise of his first proclamation: he made the army rich.

As he made himself financially independent of the Government, so he began to develop an independent policy. Hitherto he had had no politics, but had been content to talk the Jacobinism of the ruling party; now he took a line, and it was not quite that of the Government. He had already, in June, 1796, invaded the papal territory, and concluded a convention at Bologna by which he extorted \$3,000,000 from the pope; immediately after the fall of Mantua he entered the States of the Church again, and concluded the treaty of Tolentino on February 19th. Now in dealing with the pope he separated his policy from that of the Directory. He demanded indeed the cession of Bologna, Ferrara, and the Romagna, besides Avignon and the Venaissin, and the temporary cession of Ancona. But he recognized

the pope by treating with him, and toward the Catholic religion and the priesthood he showed himself unexpectedly merciful. Religion was not to be altered in the ceded Legations, and Bonaparte extended his protection in the most ostentatious manner to the *prêtres insermentés*, whom he found in large numbers in the States of the Church. His manner of conducting the war was as unprecedented as his relation to the Government, and in like manner foreshadowed the Napoleonic period. It was not that of a civilized belligerent, but of a universal conqueror. The Revolution had put all international law into abeyance. Bonaparte in Italy, as in his later wars, knew nothing of neutrality. Thus Tuscany, the first of all states to conclude a treaty with the French republic, was not thereby saved from invasion. Bonaparte's troops marched in, seized Leghorn, and took possession of all the English property found in that port. More remarkable still was the treatment of Venice. The territory of the republic was turned unceremoniously into a field of battle between France and Austria, and at the end of the war the Venetian republic was blotted out of the map.

The summer of 1797 was passed by Bonaparte at Montebello near Milan. Here he rehearsed in Italy the part of emperor, formed his court, and accustomed himself to all the functions of government. He was chiefly engaged at this time in accomplishing the dissolution of the Venetian republic. He had begun early in the spring by provoking insurrections in Brescia and Bergamo. In April the insolence of a French officer provoked a rising against the French in Salò, for which Junot, sent by Bonaparte, demanded satisfaction of the senate on the 15th. The French now attempted to disarm all the Venetian garrisons that remained on the *terra firma*, and this led to a rising at Verona in which some hundreds of Frenchmen were massacred (April 17th). On the 19th a French sea-captain, violating the customs of the port at the Lido, was fired upon from a Venetian fort. Bonaparte declared that he would now be a new Attila to Venice, and issued a declaration of war. The feeble Government could only submit. A revolution took place at Venice, and French troops took possession of the town on May 16th. A treaty was now concluded by Bonaparte "establishing peace and friendship between the French republic and the republic of Venice," and providing that "the French occupation should cease as soon as the new Government should declare that it no longer needed foreign assistance." "A principal object of this treaty," as Bonaparte candidly explained to the Directory, "was to obtain possession without hindrance of the city, the arsenal, and everything." At the time that he was thus establishing friendship he was, as we know, ceding the territory of Venice, including at last the town, to Austria.

Austria had still one hope, for it seemed impossible that France herself could suffer Bonaparte to run his headlong career without interference, especially as she now had popular assemblies. The difficulty which Bonaparte had dissipated by his cannon in Vendémiaire had returned, as it could not fail to do. A Jacobinical regicide republic had to support itself in the midst of a nation which was by no means Jacobinical, and which had representative assemblies. These assemblies, renewed by a third, for the second time in the spring of 1797, placed Pichegru, suspected of royalism, in the chair of the Five Hundred, and Europe began to ask whether the restoration of the Bourbons was about to follow. Bonaparte at Montebello found that the Austrian negotiators were bent upon delay.

The rising party was not, perhaps, mainly royalist; its most conspicuous representative, Carnot, the Director, was himself a regicide. In the main it aimed only at

respectable government and peace, but a minority were open to some suspicion of royalism. This suspicion was fatal to the whole party, since royalism had by this time been thoroughly discredited by the follies of the *émigrés*.

The catastrophe came on 18th Fructidor (September 4, 1797), when Augereau, one of Bonaparte's generals of division, who had been sent by Bonaparte to Paris, surrounded the Corps Législatif with 12,000 men and arrested the most obnoxious representatives, while another force marched to the Luxembourg, arrested the Director Barthélemy, and would have arrested Carnot had he not received warning in time to make his escape. This stroke was followed by an outrageous proscription of the new party, of whom a large number, consisting partly of members of the Councils, partly of journalists, were transported to die at Cayenne, and the elections were annulled in forty-eight departments.

Such was Fructidor, which may be considered as the third of the revolutions which compose the complex event usually known as the French Revolution. In 1789 the absolute monarchy had given place to a constitutional monarchy, which was definitely established in 1791. In 1792 the constitutional monarchy fell, giving place to a republic which was definitely established in 1795. Since 1795 it had been understood that revolution was over, and that France was living under a constitution. But in Fructidor this constitution also fell, and government became revolutionary again. It was evident that a third constitution must be established; it was evident also that this constitution must set up a military form of government—that is, an imperialism; but two more years passed before this was done.

The benefit of the change was reaped in the end by Bonaparte. Naturally he favored it and took a great share in contriving it. But it seems an exaggeration to represent him as the exclusive or even the principal author of Fructidor. Hoche took the same side as Bonaparte.

The death of Hoche, occurring soon after, removed from Bonaparte's path his only rival in the affections of the already omnipotent soldiery. Hoche alone among the generals beside Bonaparte had shown political talents; had he lived longer, he might have played with success the part in which Moreau afterward failed.

The revolution of Fructidor, being military, had an immediate effect on foreign affairs. It commenced the period which was to last till the fall of Napoleon, a period of war pursued by France for its own sake, and as a kind of national business. As negotiations with England were at once violently broken off, so a change came over the negotiations with Austria. With the fall of the peace party Austria lost all hope of favorable terms. Between the beginning of September and the middle of October this struggle continued; at length, on October 17th, the treaty was signed at the little village of Campo Formio (more correctly Campo Formido), close to Udine. Bonaparte took his own course, gave Venice, Istria, Dalmatia, and all Venetian territory beyond the Adige to Austria, founded the Cisalpine Republic, and reserved for France, besides Belgium, Corfu and the Ionian Islands. A congress was to open at Rastatt, and Austria bound herself by a secret article to do her best to procure for France from the Germanic body the left bank of the Rhine. By retaining the Ionian Islands Bonaparte gave the first intimation of his design of opening the Eastern question.

He now left Italy, setting out from Milan on November 17th, made a flying visit to Rastatt, where the congress had already assembled, and reached Paris on December 5th. What next would be attempted by the man who at twenty-seven had conquered Italy and

brought to an end the most memorable Continental war of modern times? From a speech delivered by him on the occasion of his reception by the Directory it appears that he had two thoughts in his mind—to make a revolution in France and to emancipate Greece. He had now some months in which to arrange the execution of these plans. The Directory, seeing no safety but in giving him employment, now committed the war with England to his charge. He becomes “général en-chef de l'armée d'Angleterre.” During the last war between Russia and Turkey some publicists (including Volney, an acquaintance of Bonaparte's) had recommended France to abandon her ancient alliance with Turkey and seek rather to share with Russia in her spoils. Thus was suggested to Bonaparte in Italy the thought of seizing Greece. Now as head of the army of England he fixed his eyes on Egypt also. In India the game was not quite lost for France, but England had now seized the Cape of Good Hope. To save, therefore, what remained of her establishments in India, France must seize Egypt. She must not only conquer but colonize it. Such was the scheme, according to which Turkey was to be partitioned in the course of a war with England, as Venice had disappeared in the course of a war with Austria.

That such a scheme could scarcely fail to kindle a new European war more universal than that which Bonaparte had just brought to a close was probably its principal recommendation in his eyes. He also instinctively saw that, while he conquered in the East, France, deprived of her best troops and generals, would suffer disasters at home, though he could not anticipate what actually happened—that she would be unfortunate both at home and in the East. But the European war showed signs of recommencing even before he could set sail. In the spring of 1798 the old constitution of Switzerland was overthrown, French troops entered Bern and seized a treasure of 40,000,000 francs; at the same time a quarrel was picked with the Papal Government; it was overthrown, the treasury plundered, and the aged pope, Pius VI., carried into captivity. Thus, as Berthier said, money was furnished for the Egyptian campaign; but on the other hand Europe was thoroughly roused.

The departure of Bonaparte for the East with 30,000 men and Generals Murat, Berthier, Desaix, Kléber, Lannes, Marmon—Nelson in front of him and a European war behind—perhaps marks the moment of wildest confusion in the modern history of Europe. He set sail on May 19th, having stimulated the zeal of his soldiers by promising that each should return rich enough to buy six “arpents” of land (the Directory were obliged to deny the genuineness of the proclamation), and, eluding Nelson, who had been driven by a storm to the Island of St. Pietro near Sardinia, arrived, on June 9th, at Malta, where a squadron from Civita Vecchia and another from Ajaccio had preceded him. This island was in the possession of the Knights of St. John of Jerusalem, who acknowledged the king of Naples as their feudal superior and the czar as their protector. To attack them was to involve France in war with both Naples and Russia. Bonaparte, demanding admission into the harbor for his fleet, and receiving answer that the treaties which guaranteed the neutrality of Malta permitted only the admission of four ships, attacked at once, as indeed he had been expressly commanded by the Directory to do. The people rose against the knights; the grand master Hompesch opened negotiations, and on the 12th Bonaparte entered La Valette. He was enthusiastic about the strength and importance of the position thus won. He spent some days in organizing a new government for the island, and set sail again on the 19th. On July 2d he issued his first order in Alexandria.

During the passage we find him prosecuting his earlier scheme of the emancipation of Greece. Thus from Malta he sent Lavalette with a letter to Ali Pasha of Janina. His plan therefore seemed to embrace Greece and Egypt at once, and thus to take for granted the command of the sea, almost as if no English fleet existed. The miscalculation was soon made manifest. Bonaparte himself, after occupying Alexandria, set out again on the 8th and marched on Cairo; he defeated the Mamelukes first at Chebreiss and then at Embabelh, within sight of the Pyramids, where the enemy lost 2,000 and the French about 20 or 30 killed and 120 wounded. He was in Cairo on the 24th, where for the most part he remained till January of 1799. But a week after his arrival in Cairo, the fleet which had brought him from France, with its admiral Brueys, was destroyed by Nelson in Aboukir Bay. For the first time, in reporting this event to the Directory, it seemed to flash on Bonaparte's mind that the English were masters of the sea. The grand design was ruined by this single stroke. France was left at war with almost all Europe, and with Turkey also (for Bonaparte's hope of deceiving the sultan by representing himself as asserting his cause against the Mamelukes was frustrated), and her best generals, with a fine army, were imprisoned in another continent.

It might still be possible to create a revolution in Turkey in Asia, if not in Turkey in Europe. The Turks were preparing an army in Syria, and in February, 1799, Bonaparte anticipated their attack by invading Syria with about 12,000 men. He took El Arish on the 20th, then Gaza, and arrived at Jaffa on March 3d. It was taken by assault, and a massacre commenced which, unfortunately for Bonaparte's reputation, was stopped by some officers. The consequence was that upward of 2,000 prisoners were taken. Bonaparte, unwilling either to spare food for them or to let them go, ordered the adjutant-general to take them to the seashore and there shoot them, taking precautions to prevent any from escaping. This was done. "Now," writes Bonaparte, "there remains St. Jean D'Acre." This fortress was the seat of the pasha, Jezzar. It was on the seashore, and accordingly England could intervene. Admiral Sir Sidney Smith, commanding a squadron on the coast, opened fire on the French as they approached the shore, and was surprised to find his fire answered only by mucketry. In a moment he divined that the siege artillery was to come from Alexandria by sea, and very speedily he discovered the ships that carried it and took possession of them. On March 19th Bonaparte was before Acre, but the place received supplies from the sea, and support from the English ships, while his artillery was lost. He was detained there for two whole months, and retired at last without success. This check, he said, changed the destiny of the world, for he calculated that the fall of Jezzar would have been followed by the adhesion of all the subject tribes, Druses and Christians, which would have given him an army ready for the conquest of Asia.

The failure had been partially redeemed by a victory won in April over an army which had marched from the interior to the relief of Acre under Abdallah Pasha, and which Bonaparte defeated on the plain of Esdraelon (the battle is usually named from Mount Tabor). In the middle of May the retreat began, a counterpart on a small scale of the retreat from Moscow, heat and pestilence taking the place of frost and Cossacks. On the 24th he was again at Jaffa, from which he wrote his report to the Directory explaining that he had deliberately abstained from entering Acre because of the plague which, as he heard, was ravaging the city. On June 14th his letters were again dated from Cairo. His second stay in Egypt lasted two months, which were spent partly in

hunting the dethroned chief of the Mamelukes, Murad Bey, partly in meeting a new Turkish army, which arrived in July in the Bay of Aboukir. He inflicted on it an annihilating defeat near its landing-place; according to his own account ten or twelve thousand persons were drowned. This victory marked the final failure of the expedition.

It appears from his correspondence that he had promised to be back in France as early as October, 1798, a fact which shows how completely all his calculations had been disappointed. Sir Sidney Smith now contrived that he should receive a packet of journals, by which he was informed of all that had passed recently in Europe and of the disasters that France had suffered. His resolution was immediately taken. On August 22d he wrote to Kléber announcing that he transferred to him the command of the expedition, and that he himself would return to Europe, taking with him Berthier, Lannes, Murat, Andréossi, Marmont, Monge, and Berthollet, and giving orders that Junot should follow in October and Desaix in November. After carefully spreading false accounts of his intentions, he set sail with two frigates in the night of the same day. He arrived after a voyage of more than six weeks (during which he revisited Corsica) in the harbor of Fréjus, on October 9th.

From this moment the tide of his fortune began to flow again. His reappearance seemed providential, and was hailed with delight throughout France. The system established in Fructidor was essentially military. In Italy the conquest had been pushed too far. Half the troops were locked up in fortresses or occupied in suppressing rebellions; hence Macdonald at the Trebbia and Joubert at Novi were defeated by Suwaroff, Mantua fell, and the work of Bonaparte in Italy was well-nigh undone. Government was shaken by these disasters. A kind of revolution took place in June. Four new members entered the Directory, of whom three—Gohier, Roger-Ducos, and General Moulin—represented on the whole the revival of the Jacobinism of 1793, while the fourth, Sieyès, the most important politician of this crisis, represented the desire for some new constitutional experiment. The remedy which first suggested itself was to return to the warlike fury and terrorism of 1793. The Jacobin Club revived and held its sittings in the Salle du Manège. Many leading generals, especially Jourdan and Bernadotte, favored it. But 1793 was not to be revived. Its passions had gone to sleep, and the memory of it was a nightmare. Nevertheless a sort of Terror began. The hardship of recruitment caused rebellions, particularly in the west. Chouannerie and Royalism revived, and the odious Law of Hostages was passed to meet them. After seven years of misery France, in the autumn of 1799, was perhaps more miserable than ever.

Upon this perplexing gloom the reappearance of Bonaparte came like a tropical sunrise, too dazzling for Sieyès himself, who wanted a general, but a general he could control. On October 16th he arrived at his old Parisian house in the Rue de la Victoire, and on November 9th and 10th (Brumaire 18, 19) the revolution took place. The movement which now took place was the most respectable, the most hopeful, as for a long time it seemed the most successful, effort that had been made since 1792 to lift France out of the slough. Instead of reviving Jacobinism it was resolved to organize a strong and skilled Government. A grand party of respectability rallied round Sieyès to put down Jacobinism. Ducos among the Directors (he had been converted), the majority of the Council of Ancients, Moreau and Macdonald, the generals of purest reputation, Bonaparte and the generals personally attached

to him, composed this party. On the other side the Jacobinical party consisted of the Directors Gohier and Moulin, the majority of the Council of Five Hundred, Generals Jourdan and Bernadotte. Which party would be followed by the rank and file of the army was an anxious question.

It was determined to take advantage of a provision of the constitution which had been originally inserted by the Girondists as a safeguard against aggressions from the municipality of Paris, and to cause the Council of Ancients to decree a meeting of the Councils outside Paris at the palace of St. Cloud. At this meeting it was intended to propose a reform of the constitution. The proposal would be supported by a majority in the Council of Ancients, and by many, but probably not a majority, in the Council of Five Hundred. It was foreseen that the Jacobins might give trouble, and might need to be eliminated, as they had themselves eliminated the Girondins. With a view to this, when the decree was passed on November 9th, General Bonaparte, made commander of all the troops in Paris, was intrusted with the execution of it. It is carefully to be observed that he does not, like Cromwell, act of his own free will against the assembly, but is appointed by the assembly to act in its name. No one thought of destroying the republic; the question was of introducing the famous perfect constitution of Sieyès. Bonaparte appeared, surrounded by the generals of his party, in the Council of Ancients, where he skillfully evaded taking the oath to the constitution. He then reviewed the troops, and it became apparent that he could count on them. From this moment Brumaire may be said to have been decided. The next step was that Sieyès and Ducos resigned their places on the Directory; Barras was induced to follow their example; but Gohier and Moulin were firm. Gohier was placed under ward of Moreau at the Luxembourg, while Moulin made his escape. It now only remained to deal with the Council of Five Hundred, the stronghold of Jacobinism.

The revolution was consummated on the next day at St. Cloud. Bonaparte and Sieyès sat in a private room while the Councils began their deliberations; but, being informed that it was proposed to renew the oath to the existing constitution, Bonaparte determined to interfere. Bonaparte then entered the Council of Ancients, where he delivered a confused harangue which did him little good, though the assembly was well-disposed to him. His position was a false one, though he urged very justly that the existing constitution had been practically destroyed by the illegalities of Fructidor, Floréal, and Prairial. He then passed to the hostile Council of Five Hundred, where he was received with cries of *Hors la loi! A bas le dictateur!* He was seized by the collar and attempts were made to push him out of the hall.

He was now almost in despair, and no wonder! By the backwardness of Sieyès he had been pushed into the part of Cromwell. But Cromwell had soldiers devoted to him, and of theocratic rather than republican ideas; the soldiers of Bonaparte had only just been put under his command, and they were fanatical republicans. The false step must be retrieved. The soldiers must be persuaded that Bonaparte was no Cromwell, but a stanch republican, and that they were not called upon to act against an assembly, but only against a traitorous minority, as at Fructidor. Lucien Bonaparte, who was president of the Five Hundred, performed this miracle. Bonaparte had sent grenadiers to rescue him. Lucien was at the tribune, where he was defending his brother amid noisy interruption. At the appearance of the grenadiers he threw off his official dress and retired under their escort. In the hall he mounted on horse-

back and addressed the troops who were employed to guard the legislature, declaring that the council was oppressed by assassins, brigands paid by England; he charged the soldiers to deliver the majority from this oppression by clearing the hall. He brandished a sword and swore to stab his brother if ever he attacked the liberties of Frenchmen. On the clear understanding that no violence against the assembly was intended, and with the express sanction of its president, the soldiers then cleared the hall. In the evening at nine o'clock Lucien reassembled a certain number of the members and proposed to them to nominate a committee which should report on the state of affairs. This committee was at once named, and speedily presented a report to the effect that Sieyès, Roger-Ducos, and Bonaparte should compose a provisional executive under the title of consuls, that the legislature should adjourn till February 20th (1 Ventose), a committee of twenty-five members from each Council being left to deliberate along with the consuls upon the changes to be made in the constitution; at the same time, as in Fructidor, a certain number of members (fifty-five) were to be expelled from the Councils.

Brumaire taken by itself is the victory of Sieyès rather than of Bonaparte. It raised Sieyès to the position he had so long coveted of legislator for France. The constitution now introduced was really in great part his work, but his work so signally altered in one point that it resulted in the absolute supremacy of Bonaparte.

But, while he absolutely condemned democracy, Sieyès did not want to set up despotism. The Senate was to be supreme; it was to be a kind of hereditary aristocracy, the depositary of the tradition of the Revolution; above it, and capable of being deposed by it, was to be a doge called Grand Elector, whose main function consisted in choosing two consuls, of whom one was to take the home and the other the foreign department. Here again Bonaparte acquiesced as far as he could. He adopted the consuls and the triple executive, even lowering apparently the grand elector of Sieyès by giving him the more republican title of First Consul.

The provisional consulate of Sieyès, Ducos, and Bonaparte lasted only from November 10th to December 13th. Then through the promulgation of the new constitution it made way for the definitive consulate of Bonaparte, Cambacérès, and Lebrun, which lasted four years. By the constitution of 22 Frimaire, year VIII. (which was never debated in any assembly, but, after being devised by the two legislative committees meeting at the Luxembourg under the presidency of Bonaparte, and in the presence of other consuls, and after being redacted by Daunou, was introduced by a popular vote), Bonaparte became First Consul for ten years, with a salary of 500,000 francs, with a sole power of nominating the council of state, the ministers, ambassadors, officers of army and fleet, and most of the judges and local officials, and with a power in nominal conjunction with the other consuls of initiating all legislation and deciding war and peace. Sieyès and Ducos retired, and under the new constitution the second and third consuls were Cambacérès, an eminent legist, and Lebrun, an old official of Louis XV.'s time. The party of Brumaire had intended to set up a republic, but this constitution created a strong monarchy under the thinnest disguise.

To Moreau the success of Brumaire had been mainly due, and he had perhaps thought that the new constitution, and it did not seem to contemplate the First Consul commanding an army, had removed Bonaparte from the path of his ambition. He now held the command of the principal army, that of the Rhine, in which post Bonaparte could not venture to supersede him. The

problem for Bonaparte throughout the war was to prevent Moreau, and in a less degree Masséna, who was now in command of the army of Italy, from eclipsing his own military reputation. Russia had now retired from the Coalition, so that, as in 1796, Austria and England were the only belligerents. Italy had been almost entirely lost, and Masséna, at the head of the army of Italy, opposed to General Melas, was almost where Bonaparte had been before his Italian campaign began. But France had retained the control of Switzerland, and Moreau with more than 100,000 men arranged along the Rhine from the Lake of Constance to Alsace stood opposed to Kray, whose headquarters were at Donauechingen. It seemed that the campaign would be conducted by Moreau and Masséna receiving instructions from Bonaparte at Paris.

The campaign of Marengo was astonishingly short. On May 11th Bonaparte left Geneva, and he was in Paris again before the end of June. In Italy the affairs of France looked darker than ever, when Bonaparte threw himself on the rear of Melas by passing the Great St. Bernard between May 15th and 20th. Other divisions passed the Little St. Bernard and the Mont Cenis, while the detachment from Moreau's army (under Moncey, not Lecourbe) descended the St. Gotthard. It seems that the Austrians had absolutely refused to believe, what was openly discussed in the Paris journals, that Bonaparte intended to cross the Alps. Bonaparte had another surprise in store for them. Though Genoa was suffering all the horrors of famine, he made no attempt to relieve it, but turned to the left, entered Milan, and took possession of the whole line of the Ticino and the Po. Meanwhile Genoa capitulated to General Ott. Melas was now at Alessandria, where Bonaparte sought him on the 13th. On the 14th Melas marched out, crossed the Bormida, and arrived at Marengo. The victory here won by Bonaparte, though in its consequences more decisive than any other, and marking in a certain sense the culmination of his career, yet was due almost entirely to accident. A sudden charge of cavalry by Kellermann changed a great Austrian victory into a decisive Austrian defeat. On the next day Melas (having, as it seems, quite lost his head) signed a convention by which Austria sacrificed almost all North Italy, restoring something like the position of Campo Formio. Bonaparte returned to Paris, victorious at once over Austria and over Moreau and Masséna. He did not, however, succeed in tearing from Moreau the honor of concluding the war. Marengo did not lead to peace; this was won, where naturally it could only be won, in Bavaria by Moreau's victory of Hohenlinden (December 3d), a victory perhaps greater than any of which at that time Bonaparte could boast.

Never was Bonaparte more recklessly audacious, never was he more completely and undeservedly successful, than in this campaign.

His appeal for peace after Brumaire had not been purely insincere, though he wanted victory before peace. He proposed to Rouget de Lisle to write "a battle hymn which shall express the idea that with great nations peace comes after victory." After Marengo he devoted himself to giving peace to the world; he did this by three great acts, so that in 1802 for the first time for ten years under the new Augustus "no war or battle sound was heard the world around." These three acts are the treaty of Lunéville, February, 1801, the Concordat, July, 1801, the treaty of Amiens, March, 1802.

After the treaty of Lunéville, as after that of Campo Formio, England was left to fight France alone; but Bonaparte had now a higher estimate than in 1798 of England's naval power. He was able, however, in

1801 to attack her in another way. By her conduct at Malta she had given offense to the czar Paul, and taking advantage of this Bonaparte was able to revive against her the armed neutrality of 1780. Not only Russia but Prussia was thus brought for the first time, along with Sweden and Denmark, into the French alliance, and the system of Tilsit was for the first time sketched out. But it lasted only for a moment. At the beginning of April the announcement of the murder of Paul and the bombardment of Copenhagen by Nelson dissolved it. England and France were now alike disposed for peace, the former because she had lost the support of a European Coalition, the latter because she had lost all means of attack, and also because of Bonaparte's grand plan of pacification. In the summer Bonaparte's endeavors were confined to saving the French colony in Egypt from the English, and to snatching a little territory from England's ally Portugal by means of Spain. But Cairo capitulated to the English in June, in which month also Spain made peace with Portugal. Accordingly in October the preliminaries of London were signed, and the treaty of Amiens followed in March. The allies of France paid for her naval defeats, Spain losing Trinidad and Holland Ceylon; but France, though she lost nothing, acquiesced by this treaty in the total failure of all her designs upon the East.

The globe was now at peace, and thanked Bonaparte for it. The equilibrium which had been destroyed by the Revolution seemed at length to be restored. Meanwhile the legislative reconstruction of France proceeded rapidly. This is the glorious period of Bonaparte's life, not, as has often been alleged, because he was as yet uncorrupted by power, but simply because a strong, intelligent government was the great need of France and repose the great need of Europe, and Bonaparte at this time satisfied both needs. The work of reconstruction which distinguishes the consulate, though it was continued under the empire, is the most enduring of all the achievements of Napoleon. The institutions of Modern France date, not, as is often said, from the Revolution, but from the consulate. Not that Napoleon personally was endowed with a supreme legislative genius; his principal merit was to have given to France the first secure government, the first government capable of effective legislation, that she had had since the destruction of her ancient institutions. The task of reconstruction fell to him of necessity; his personal interference was in many respects, as we shall see, mischievous rather than beneficial; it is, however, also true that he appreciated the greatness of the work, urged it on with vigor, entered into it, impressed it with the stamp of his own personality, and left upon it the traces of his keen sagacity.

The institutions now created, and which form the organization of modern France, are—(1) the restored Church, resting on the Concordat; (2) the University, resting on the law of 11 Floréal, An X. (May 1, 1802); (3) the judicial system, commenced by the law of 27 Ventose, An VIII. (March 18, 1800), and completed by other laws in 1810; (4) the Codes:—(a) Code Civil (commission nominated 24 Thermidor, An VIII., August 12, 1800; it received the name Code Napoléon on September 3, 1807), (b) Code de Commerce, promulgated on September 10, 1807; (c) Code Pénal, (d) Code d'Instruction Criminelle (came into force January 1, 1811); (5) the system of local government, resting on the law of 18 Pluviose, An VIII. (February 7, 1800); (6) the Bank of France, established 28 Nivose, An VIII. (January 18, 1800); (7) the Legion of Honor, established 29 Floréal An X. (May 19, 1802). These institutions, along with the military system, have in the main continued to the

present day after the downfall of all the Napoleonic institutions which were purely political.

From the time of the battle of Marengo the system of Brumaire began to take a development which perhaps had not been clearly foreseen. Sieyès had wished to confine Bonaparte to the war department, Moreau perhaps had wished to keep him at Paris; in either case it had not been intended to create an august monarchy. But the fabulous success of Marengo, joined to the proofs Bonaparte gave of a really superior intelligence and commanding character, turned the French mind back into that monarchical groove in which it had so long run before the Revolution.

In grappling with the defeated parties Bonaparte found a great advantage in his position. The constitution of Brumaire itself gave him great powers; popular institutions had been destroyed, not by him, but by the nation itself, which was weary of them; under the Directory the public had grown accustomed to the suppression of journals and to periodic *coups d'état* of the most savage violence. Bonaparte therefore could establish a rigorous despotism under the forms of a consular republic, mutilate the assemblies, and silence public opinion; he could venture occasionally upon acts of the most sweeping tyranny without shocking a people which had so lately seen Fructidor, not to say the Reign of Terror, and had been accustomed to call them liberty. The conspiracies began immediately after the return from Marengo, when the Corsicans Arena and Ceracchi, guilty apparently of little more than wild talk, were arrested in October, 1800, at the Théâtre Français. But on December 24th of the same year, as he drove with Josephine to the opera, a sudden explosion took place in the Rue Saint-Nicaise, which killed and wounded several people and damaged about fifty houses; the carriage of Bonaparte escaped. He arrested and transported 130 persons, whom he knew to be innocent of the plot, on the general ground of Jacobinism, substituting for all legal trial a resolution passed by the servile senate to the effect that "the measure was conservative of the constitution."

The first open step toward monarchy was made at the conclusion of the treaty of Amiens. As pacificator of the globe, it was declared in the tribunate that Bonaparte deserved some mark of public gratitude. Upon this the Senate proposed to reëlect him First Consul for a further term of ten years. Bonaparte, disappointed, declared that he could only owe a prolongation of his magistracy to the people; to them therefore the question was referred, but in the form, Shall Napoleon Bonaparte be elected consul for life? and in this form it was adopted. Before the final step was taken and the First Consul transformed himself into the Emperor Napoleon, a great and portentous change had taken place in the spirit of his government. Before the year 1803, there was no fair reason to conclude that Bonaparte was too fond of war. For the two wars of the Revolution he had not been responsible; the first broke out when he was in Corsica, the second when he was in Egypt. But both wars had been brought to an end by him. In constructive legislation he had shown such zeal that it was easy to imagine him, though a great commander, as one who was capable of feeling the blessedness of the peacemaker. These illusions began to vanish in 1803, at the rupture of the peace of Amiens. This year, 1803, is the turning-point in his life, and a great turning-point in French history. It may be considered the first year of modern France.

This same year 1803 saw the first steps taken toward the subjugation of Germany. The annexation to France of the left bank of the Rhine led to a revolution in the Germanic system and to a complete transforma-

tion of the Diet, by which Austria lost the greater part of her influence over the minor German states; this influence passed to France. As soon as the rupture with England took place Bonaparte took up a position in the heart of Germany by seizing Hanover.

All this was done while Bonaparte was still nominally only consul in the French republic. But the rupture with England furnished him with the occasion of throwing off the last disguise and openly restoring monarchy. It was a step which required all his audacity and cunning. He had crushed Jacobinism, but two great parties remained. There was first the more moderate republicanism, which might be called Girondism, and was widely spread among all classes and particularly in the army. Secondly, there was the old royalism, which after many years of helpless weakness had revived since Brumaire. These two parties, though hostile to each other, were forced into a sort of alliance by the new attitude of Bonaparte, who was hurrying France at once into a new revolution at home and into an abyss of war abroad. Royalism from England began to open communications with moderate republicanism in France. Pichegru acted for the former, and the great representative of the latter was Moreau, who had helped to make Brumaire in the tacit expectation probably of rising to the consulate in due course when Bonaparte's term should have expired, and was therefore hurt in his personal claims as well as in his republican principles. Bonaparte watched the movement through his ubiquitous police, and with characteristic strategy determined not merely to defeat it, but to make it his stepping-stone to monarchy. He would ruin Moreau by fastening on him the stigma of royalism; he would persuade France to make him emperor in order to keep out the Bourbons. Moreau had in 1797 incurred blame by concealing his knowledge of Pichegru's dealings with the royalists. That he should now meet and hold conversation with Pichegru at a moment when Pichegru was engaged in contriving a royalist rebellion associated his name still more closely with royalism, and Pichegru brought with him wilder partisans such as Georges the Chouan. Bonaparte succeeded in associating Moreau with royalist schemes and with schemes of assassination. Controlling the Senate, he was able to suppress the jury; controlling every avenue of publicity, he was able to suppress opinion; and the army, Moreau's fortress, was won through its hatred of royalism. In this way Bonaparte's last personal rival was removed. There remained the royalists, and Bonaparte hoped to seize their leader, the Comte d'Artois, who was expected, as the police knew, soon to join Pichegru and Georges at Paris. What Bonaparte would have done with him we may judge from the course he took when the Comte did not come. On March 15, 1804, the Duc d'Enghien, grandson of the Prince de Condé, residing at Ettenheim in Baden, was seized at midnight by a party of dragoons, brought to Paris, where he arrived on the 20th, confined in the castle of Vincennes, brought before a military commission at two o'clock the next morning, asked whether he had not borne arms against the republic, which he acknowledged himself to have done, conducted to a staircase above the moat and there shot, and buried in the moat.

This deed was perfectly consistent with Bonaparte's professed principles, so that no misunderstanding or passing fit of passion is required to explain it. He had made, shortly before, a formal offer to the pretender through the king of Prussia, by which he had undertaken to pay him a handsome pension in return for the formal abdication of his rights. This had been refused, and Bonaparte felt free. That the best course was to strike at the heads of the family was a shrewd con-

clusion. Neither Louis nor Charles was precisely a hero; and then the whole revolutionary party in France would applaud a new tragedy like that of January, 1793. That the Duc d'Enghien was innocent of the conspiracy was nothing to the purpose; the act was political, not judicial; accordingly he was not even charged with complicity. That the execution would strike horror into the cabinets, and perhaps bring about a new Coalition, belonged to a class of considerations which at this time Bonaparte systematically disregarded.

This affair led immediately to the thought of giving heredity to Bonaparte's power. The thought seems to have commended itself irresistibly even to strong republicans and to those who were most shocked by the murder. To make Bonaparte's position more secure seemed the only way of averting a new Reign of Terror or new convulsions. Like Cromwell, he was afraid of the republicanism of the army, and heredity pure and simple brought him face to face with the question of divorcing Josephine. To propitiate the army he chose from the titles suggested to him—consul, stadtholder, etc.—that of emperor, undoubtedly the most accurate, and having a sufficiently military sound. The other difficulty, after much furious dissension among the two families of Bonaparte and Beauharnais, was evaded by giving Napoleon himself (but none of his successors) a power of adoption, and fixing the succession, in default of a direct heir natural or adoptive, first in Joseph and his descendants, then in Louis and his descendants. Except abstaining from the regal title, no attempt was made to conceal the abolition of republicanism. Bonaparte was to be called Napoleon, and "sire" and "majesté;" grand dignitaries with grand titles were appointed; and "citoyen" from this time gave way to "monsieur." The change was made by the constituent power of the Senate, and the *senatus-consultus* is dated May 18, 1804. It required some impudence to condemn Moreau for royalism at the very moment that his rival was reëstablishing monarchy. Yet his trial began on May 15th. The death of Pichegru, nominally by suicide, on April 6th had already furnished the rising sultanism with its first dark mystery. Moreau was condemned to two years' imprisonment, but was allowed to retire to the United States.

Throughout 1804 and the first part of 1805 the policy of Bonaparte was such as might be called insane, if he had had the ordinary objects of a ruler; it is explained by the consideration that he wanted war, even if it should be war with all the world. He had acted in a similar way in 1798. In thinking that he should profit by war he was not mistaken. Had he only gone to war with the whole continent at once, he would not, as the event proved, have overestimated his strength. But he was not, in the long run, a match for England and the Continent together; he made at starting the irremediable mistake of not dividing these two enemies. He seems, indeed, to have set out with a monstrous miscalculation which might have ruined him very speedily, for he had laid his plans for an invasion of England and a war in Europe at the same time.

The new empire compared itself to that of Charlemagne, which extended over Italy and Germany, and on December 2, 1804, a parody of the famous transference of the empire took place in Notre Dame, the pope (Pius VII.) appearing there to crown Napoleon, who, however, took the crown from his hands and placed it himself upon his own head. Meanwhile the Italian republic was changed into a kingdom, which at first Bonaparte intended to give to his brother Joseph, but in the end accepted for himself. In the first months of 1805, fresh from the *sacre* in Notre Dame, he visited Italy and received the iron crown of the Lombard kings

at Milan. Soon after the Ligurian republic was annexed, and a principality was found for his brother-in-law Bacciochi in Lucca and Pionbino.

Had public opinion been less enslaved in France, had the frivolity of the nation been less skillfully amused by the operatic exhibitions of the new court and the *sacre* in Notre Dame, it would have been remarked that, after most needlessly involving France in war with England, Bonaparte had suffered half the year 1803, all the year 1804, and again more than half the year 1805 to pass without striking a single blow, that after the most gigantic and costly preparations the scheme of invasion was given up, and that finally France suffered a crushing defeat at Trafalgar which paralyzed her on the side of England for the rest of the war. In order to understand in any degree the course he took, it seems necessary to suppose that the intoxication of the Marengo campaign still held him, that as then, contrary to all expectation, he had passed the Alps, crushed his enemy, and instantly returned, so now he made no doubt of passing the Channel, signing peace in London, and returning in a month with a fabulous indemnity in his pocket to meet the coalition in Germany. To conquer England it was worth while to wait two years, but his position was very critical when, after losing two years, he was obliged to confess himself foiled. He retrieved his position suddenly, and achieved a triumph which, though less complete than that which he had counted on, was still prodigious—the greatest triumph of his life.

It was at the end of August, 1805, that Napoleon made his sudden change of front. At the beginning of that month he had been still intent on the invasion of England; ever since March maritime manœuvres on an unparalleled scale had been carried on with the object of decoying the English fleets away from the Channel, and so giving an opportunity for the army of invasion to cross it in a flotilla under the protection of French fleets. But in spite of all manœuvres a great English fleet remained stationary at Brest, and Nelson, having been decoyed to Barbados, returned again. In the last days of August, Admiral Villeneuve, issuing from Ferrol, took alarm at the news of the approach of an English fleet, and instead of sailing northward, faced about and retired to Cadiz. Then for the first time Napoleon admitted the idea of failure, and saw the necessity of screening it by some great achievement in another quarter. He resolved to throw his whole force upon the Coalition, and to do it suddenly. Prussia was to be bribed by the very substantial present of Hanover.

Five years had passed since Napoleon had taken the field when the second period of his military career began. He now began to make war as a sovereign with a boundless command of means. For five years, from 1805 to 1809 he took the field regularly, and in these campaigns he founded the great Napoleonic empire. By the first he broke up the Germanic system and attached the minor German states to France, by the second he humbled Prussia, by the third he forced Russia into an alliance, by the fourth he reduced Spain to submission, by the fifth he humbled Austria. Then followed a second pause, during which for three years Napoleon's sword was in the sheath, and he was once more ruler, not soldier.

Napoleon's strategy always aimed at an overwhelming surprise. As in 1800, when all eyes were intent on Genoa, and from Genoa the Austrians hoped to penetrate into France, he created an overwhelming confusion by throwing himself across the Alps and marching not upon Genoa but upon Milan, so now he appeared not in front of the Austrians but behind them and between them and Vienna. Mack, who at Naples in 1799

had moved the impatient contempt of Nelson, now stood matched against Napoleon at the height of his power. He occupied the line of the Iller from Ulm to Memmingen, expecting the attack of Napoleon, who personally lingered at Strasburg, in front. Meanwhile the French armies swarmed from Hanover and down the Rhine, treating the small German states half as allies, half as conquered dependents, and disregarding all neutrality, even that of Prussia, till they took up their positions along the Danube from Donauwörth to Ratisbon far in the rear of Mack. The surprise was so complete that Mack, who in the early days of October used the language of confident hope, on the 19th surrendered at Ulm with about 26,000 men, while another division, that of Werneck, surrendered on the 18th to Murat at Nördlingen. In a month the whole Austrian army consisting of 80,000 men, was entirely dissolved. Napoleon was master of Bavaria, recalled the elector to Munich, and received the congratulations of the electors of Würtemberg and Baden (they had just at this time the title of electors). It was the stroke of Marengo repeated, but without a doubtful battle and without undeserved good luck.

After Marengo it had been left to Moreau to win the decisive victory and to conclude the war; this time there was no Moreau to divide the laurels. The second part of the campaign began at once; on October 28th Napoleon reported that a division of his army had crossed the Inn. He had now to deal with the Russians, of whom 40,000 men had arrived under Kutusoff. He reached Linz on November 4th, where Gyulai brought him the emperor's proposals for an armistice. He replied by demanding Venice and Tyrol and insisting upon the exclusion of Russia from the negotiations, conditions which, as he no doubt foresaw, Gyulai did not think himself authorized to accept. But Napoleon did not intend this time, as in 1797 and in 1800, to stop short of Vienna. Nothing now could resist his advance, for the other Austrian armies, that of the archduke John in Tyrol and that of the archduke Charles on the Adige, were held in play by Ney and Masséna, and compelled at last, instead of advancing to the rescue, to retire through Carniola into Hungary. On November 14th he dates from the palace of Schönbrunn; on the day before Murat had entered Vienna, which the Austrian emperor, from motives of humanity, had resolved not to defend, and the French also succeeded in getting possession of the bridges over the Danube. So far his progress had been triumphant, and yet his position was now extremely critical. The archduke Charles was approaching from Hungary with 80,000 Austrians; another Russian army was entering Moravia to join Kutusoff, who had with great skill escaped from the pursuit of Murat after the capture of Vienna. Napoleon, though he had brought 200,000 men into Germany had not now, since he was obliged to keep open his communications down the valley of the Danube, a large army available for the field. But, what was much more serious, he had recklessly driven Prussia into the opposite camp. He had marched troops across her territory of Ansbach, violating her neutrality, and in consequence on November 3d (while Napoleon was at Linz) she had signed with Russia the treaty of Potsdam, which practically placed 180,000 of the most highly drilled troops in the world at the service of the Coalition.

As at Marengo, fortune favored his desperate play. The allies had only to play a waiting game, but this the Russians and their young czar, who was now in the Moravian headquarters, would not consent to do. He was surrounded by young and rash counselors, and the Russians, remembering the victories of Suwaroff in 1799,

and remarking that almost all Napoleon's victories hitherto had been won over Austrians, had not yet learned to be afraid of him. Napoleon became aware of their sanguine confidence from Savary, whom he had sent to the czar with proposals; he contrived to heighten it by exhibiting his army as ill-prepared to Dolgorouki, sent to him on the part of the czar. The end was that the Russians (80,000 men, aided by about 15,000 Austrians) rushed into the battle of Austerlitz (December 2, 1805), which brought the third Coalition to an end, as that of Hohenlinden had brought the second. Nowhere was Napoleon's superiority more manifest; the Russians lost more than 20,000 men, the Austrians 6,000. The former retired at once under a military convention, and before the year 1805 was out the treaty at Pressburg was concluded with Austria (December 26th) and that of Schönbrunn with Prussia (December 15th).

It was a transformation scene more bewildering than even that of Marengo, and completely altered the position of Napoleon before Europe. In the summer of 1806 the emperor of Austria (he had this title since 1804) solemnly abdicated the title of Roman emperor; the ancient diet of Ratisbon was dissolved, and a new organization was created under the name of Confederation of the Rhine, in which the minor states of Germany were united under the protectorate of Napoleon. Bavaria and Würtemberg at the same time were raised into kingdoms. In all the changes which have happened since, the Holy Roman Empire has never been revived, and this event remains the greatest in the modern history of Germany.

The first half of 1806 was devoted to the internal reconstruction of Germany and to the negotiation of peace with the two great belligerents who remained after Austria and Prussia had retired, viz., England and Russia. But these negotiations failed, and in failing created suddenly a new Coalition. In England, Fox showed unexpectedly all the firmness of Pitt; and the czar refused his ratification to the treaty which his representative at Paris, D'Oubril, had signed. But the negotiations had gone far enough to give Prussia deep offense. At a moment when she found herself almost shut out of the German world by the new Confederation, Napoleon was found coolly treating with England for the restoration of Hanover to George III. In August, 1806, just at the moment of the dissolution of the Holy Roman Empire and the formation of the Confederation of the Rhine, Prussia suddenly mobilized her army, and about the same time Russia rejected the treaty. This amounted practically to a new Coalition, or to a revival of the old one with Prussia in the place of Austria. No one knew so well as Napoleon the advantage given by suddenness and rapidity. The year before he had succeeded in crushing the Austrians before the Russians could come up; against Prussia he had now the advantage that she had long been politically isolated, and could not immediately get help from either Russia or England—for the moment only Saxony and Hesse-Cassel stood by her—while his armies, to the number of 200,000 men, were already stationed in Bavaria and Swabia, whence in a few days they could arrive on the scene of action. The year before Austria had been ruined by the incapacity of Mack; Prussia now suffered from an incapacity diffused through the higher ranks both of the military and of the civil service. Generals too old, such as Brunswick and Möllendorf, a military system corrupted by long peace, a policy without clearness, a diplomacy without honor, had converted the great power founded by Frederick into a body without a soul. There began a new war of which the incidents are almost precisely parallel to those of the war which had so lately closed. As the

Austrians at Ulm, so now Napoleon crushed the Prussians at Jena and Auerstädt (October 14th) before the appearance of the Russians; as he entered Vienna, so now he entered Berlin (October 27th); as he fought a second war in Moravia, in which Austria played a second part to Russia, so now from November, 1806, to June, 1807, he fought in East Prussia against the Russians aided with smaller numbers by the Prussians; as he might then, after all his successes, have been ruined by the intervention of Prussia, so now, had Austria struck in, he might have found much difficulty in making his way back to France; as at Austerlitz, so at Friedland in June, 1807, the Russians ran hastily into a decisive battle in which they ruined their ally but not themselves; as Austria at Pressburg, so Prussia at Tilsit signed a most humiliating treaty, while Russia, as before, escaped, not this time by simply retiring from the scene, but by a treaty in which Napoleon admitted her to a share in the spoils of victory.

Here was a second catastrophe far more surprising and disastrous than that which it followed so closely. The defeat of Austria in 1805 had been similar to her former defeats in 1800 and 1797; Ulm had been similar to Hohenlinden, the treaty of Pressburg to that of Lunéville. But the double defeat of Jena and Auerstädt, in which the duke of Brunswick, the old general not only of 1792 but of the Seven Years' War, found his death, dissolved forever the army of the great Frederick; and it was followed by a general panic, surrender of fortresses, and submission on the part of civil officials, which seemed almost to amount to a dissolution of the Prussian state. Prussia was partitioned between Saxony, Russia, and a newly established Napoleonic kingdom of Westphalia. Her population was reduced by one-half, her army from 250,000 to 42,000 (the number fixed a little later by the treaty of September, 1808), and Napoleon contrived also by a trick to saddle her for some time with the support of a French army of 150,000 men. She was in fact, and continued till 1813 to be, a conquered state. Russia on the other hand came off with more credit, as well as with less loss, than in the former campaign. At Eylau in January, 1807, she in part atoned for Austerlitz. It was, perhaps, the most murderous battle that had been fought since the wars began, and it was not a victory for Napoleon. Friedland, too, was well contested.

The empire as founded in 1804 did not, perhaps, differ so much from the consulate after Marengo as both differed, alike in spirit and in form, from the empire such as it began to appear after Pressburg and was consolidated after Tilsit. Between 1800 and 1805 Napoleon, under whatever title, was absolute ruler of France, including Belgium, the left bank of the Rhine, Savoy, and Nice, and practically also ruler of Holland, Switzerland, and North Italy to the Adige, which states had a republican form. The title emperor meant in 1804 little more than military ruler. But now emperor has rather its mediæval meaning of paramount over a confederacy of princes. Napoleon had become a king of kings. The Bonaparte family, which before had contended for the succession in France, so that Joseph actually refused, as beneath him, the crown of Italy, now accepted subordinate crowns. Joseph became king of Naples, the Bourbon dynasty having been expelled immediately after the peace of Pressburg; Louis became king of Holland; Jerome, the youngest brother, received after Tilsit a kingdom in North Germany composed of territory taken from Prussia, of Hanover, and of the electorate of Hesse-Cassel, which had shared the fall of Prussia; somewhat earlier Murat, husband of the most ambitious of the Bonaparte sisters, Caroline, had re-

ceived the grand-duchy of Berg. By the side of these Bonaparte princes there were the German princes who now looked up to France, as under the Holy Roman Empire they had looked up to Austria. These were formed into a confederation in which the archbishop of Mainz (Dalberg) presided, as he had before presided in the empire. Two of the princes had now the title of kings, and, enriched as they were by the secularization of church lands, the mediatization of immediate nobles, and the subjugation of free cities, they had also the substantial power. A princess of Bavaria wedded Eugène Beauharnais; a princess of Würtemberg Jerome Bonaparte. At its foundation in 1806 the Confederation had twelve members, but in the end it came to include almost all the states of Germany except Austria and Prussia.

A change seemed to take place at the same time in Napoleon's personal relations. In 1804, though the divorce of Josephine was debated, yet it appeared to be Napoleon's fixed intention to bequeath his crown by the method of adoption to the eldest son of Louis by Hortense Beauharnais. But this child died suddenly of croup in the spring of 1807, while Napoleon was absent in Germany, and the event occurring at the moment when he attained his position as king of kings probably decided him in his own mind to proceed to the divorce.

It was impossible to give crowns and principalities to the Bonaparte family without allowing a share of similar distinctions to the leading politicians and generals of France. He was therefore driven to revive titles of nobility. When, in 1802, he received the life-consulate, he had proceeded instantly to create new dotations for the senators; now he felt that he must devise for them still more splendid bribes. His first plan was to give them feudal lordships outside France. Thus Berthier, his most indispensable minister, became sovereign prince of Neufchatel, Bernadotte sovereign prince of Pontecorvo, Talleyrand sovereign prince of Benevento. Especially out of the Venetian territory, given to France at Pressburg, were taken fiefs (not less than twelve in all), to which were attached the title of duke. These innovations fell in 1806, that is, in the middle of the period of transformation. But after Tilsit, when Napoleon felt more strongly both the power and the necessity of rewarding his servants, he created formally a new noblesse and revived the *majorat* in defiance of the revolutionary code. In the end, besides the three sovereign princes just mentioned, he created four hereditary princes (Berthier is in both lists) and thirty-one hereditary dukes. There were also many counts and barons. The system was prodigiously wasteful. Of public money Berthier received more than \$250,000 a year, Davoust about \$150,000, nine other officials more than \$50,000, and twenty-three others more than \$20,000.

As in 1805 he had been drawn into the conquest of Germany in the course of a war with England, so now he assailed all the neutral powers, and shortly afterward violently annexed Spain, not so much from abstract love of conquest as in order to turn against England the forces of all the Continent at once. In addition to that limited right which the belligerent has by international law to prevent by blockade the trade of a neutral with the enemy and to punish the individual trader by confiscation of ship and goods, Napoleon now assumed the right of preventing such commerce without blockade by controlling the neutral governments. English goods were to be seized everywhere, and the harbors of neutrals to be closed against English ships under penalty of war with France. Such a threat, involving a claim to criticise and judge the acts of neutral governments and to

inflict on them an enormous pecuniary fine, was almost equivalent to the annexation at one stroke of all the neutral states. The other instrument had a similar character. The French fleet having been crippled at Trafalgar, he proposed now to reënforce it by all the other fleets in Europe, and to get possession of all the resources of all the maritime states. His eyes, therefore, became now fixed on Denmark, Portugal, and Spain.

Such was Napoleon as king of kings, and such were his views. This unique phase of European history lasted five years, reckoning from the treaty of Tilsit to the breach with Russia. Europe consisted now of a confederacy of monarchical states looking up to a paramount power. The confederacy was held together by the war with England, which it put under an ineffective commercial blockade, suffering itself in return a more effective one. But Napoleon felt that Spain and Portugal must be brought under his immediate administration, in order that their maritime resources might be properly turned against England. Austria also had by no means been sufficiently humbled, and Prussia was humbled so intolerably that she was forced into plans of insurrection.

By two conventions signed at Fontainebleau on October 27th the partition of Portugal was arranged with Spain. The Prince of the Peace was to become a sovereign prince of the Algarves, the king of Spain was to have Brazil with the title of emperor of the two Americas, etc., but the main provision was that a French army was to stand on the threshold of Spain ready to resist any intervention of England. The occupation of Portugal took place soon after, Junot arriving at Lisbon on November 30th, just as the royal family with a following of several thousands set sail for Brazil under protection of the English fleet. At the same time there commenced in defiance of all treaties a passage of French troops into Spain, which continued until 80,000 had arrived, and had taken quiet possession of a number of Spanish fortresses. At last Murat was appointed to the command of the army of Spain. He entered the country on March 1, 1808, and marched on Madrid, calculating that the king would take flight and take refuge at Seville or Cadiz. A rising unparalleled for its suddenness and sublime spontaneousness took place throughout Spain and speedily found a response in Germany. A new impulse was given, out of which grew the great nationality movement of the nineteenth century. Meanwhile Napoleon, having first offered the throne of Spain to his brother Louis, who refused it, named Joseph king, retaining, however, a reversion to himself and heirs in default of male heirs of Joseph, who had only daughters. But it must have become clear to Napoleon almost at once that he had committed the most enormous of blunders. Instead of gaining Spain he had in fact lost it, for hitherto he had been master of its resources without trouble, but to support Joseph he was obliged in this same year to invade Spain in person with not less than 180,000 men. With Spain, too, he lost Portugal, which in June followed the Spanish example of insurrection, and had Spain henceforth for an ally and not for an enemy. Hitherto he had had no conception of any kind of war not strictly professional. He had known popular risings in Italy, La Vendée, and Egypt, but had never found it at all difficult to crush them. The determined insurrection of a whole nation of 11,000,000 was a new experience to him.

Thus the monarchy of Tilsit suffered within a year the most terrible rebuff. Napoleon himself now appeared upon the scene. His first step was to revive the memory of Tilsit by a theatrical meeting with Alexander, which was arranged at Erfurt in September. At the same time he checked the rising spirit of resistance in Prussia by driving from office the great reforming minister

Stein. At the beginning of November he was ready for the invasion of Spain. Joseph had retired to Vittoria, and the armies of the insurrection fronted him along the Ebro under the command of Blake, Castaños, and Palafox. Between November 7th and 11th the army of Blake was dissolved by Lefebvre, and Napoleon entered Burgos, which was mercilessly pillaged; on the 23d Castaños was defeated at Tudela by Lannes; by December 2d Napoleon, having forced the mountain passes, was before Madrid, and on the 4th he was in possession of the town, where, endeavoring somewhat late to conciliate the liberalism of Europe, he proclaimed the abolition of the Inquisition and of feudalism, and the reduction of the number of convents to one-third. He remained in Spain till the middle of January, 1809, but he was not allowed repose during the interval. Sir John Moore had advanced from Portugal as far as Salamanca, and determined in the middle of December to assist the insurrection by marching on Valladolid. Soult was at Carrion and was threatened by this advance, since the English force, after Moore had effected his junction with Baird, who arrived from Coruña, at Majorga, amounted to 25,000 men. Napoleon hoped to cut its communications, and so deal one of his crushing blows at the enemy with whom he was always at war yet whom he never, except at Waterloo, met in the field. He set out on the 22d with about 40,000 men, and marched 200 miles in ten days over mountains in the middle of winter. Moore saw the danger, retired to Benavente, and blew up the bridges over the Ezla. Napoleon advanced as far as Astorga; but he had missed his mark, and professed to receive information which showed him that he was urgently wanted at Paris. He returned to Valladolid, whence on January 19th he set out for France. The end of Moore's expedition belongs to English history.

Another storm was indeed gathering. The downfall of Austria, in 1805, had been out of all proportion to her military inferiority; it was impossible that she should acquiesce in it. The year that had followed Tilsit had given her quite a new prospect. Spain, which before had given Napoleon help, now swallowed up 300,000 of his troops, so that in the autumn of 1808 he had been obliged to withdraw from Prussia the large army which he had kept for more than a year quartered on that unhappy country. Napoleon could spare only half his force, and there was now no doubt that Prussia would be as hostile to him as she dared. Stein and Scharnhorst had been preparing a *levée en masse* in Prussia and an insurrection in the new kingdom of Westphalia. Under such circumstances began the war of 1809, which may be called the First German War of Liberation, under the leadership of Austria. Napoleon accused Austria of arming, of wanting war; Austria expostulated, but in vain; and war began. It began early in April, and the proclamation of the archduke Charles was addressed to the whole German nation. The watchword of Austria against France was now liberty and nationality. A good general conception of the war may be obtained by comparing it with that of 1805, which it resembles in certain large features. Again there was a short but decisive passage of arms in Bavaria; in a five days' struggle, celebrated for Napoleon's masterly maneuvers, the Austrians were driven out of Ratisbon, and the way to Vienna was laid open. Again Napoleon entered Vienna (May 13th). But the war in Italy this time began farther east, on the Piave. Eugène Beauharnais, after an unfortunate commencement, when he was defeated at Sacile by the archduke John, made a successful advance, and being joined by Marmont, who made his way to him from Dalma-

tia by way of Fiume, drove the Austrian army into Hungary, defeated them at Raab, and effected a junction with Napoleon at Bruck. Then, as before, the war was transferred from Vienna to the other side of the Danube. But the Austrian resistance was now far more obstinate than in 1805. From the island of Labau Napoleon threw his troops across the river in the face of the archduke. A battle took place which occupied two successive days, and is sometimes called the battle of the Marchfeld, but is sometimes named from the villages of Gross-Aspern and Essling. Like that of Eylau in 1807 it was among the most terrible and bloody battles of the period. In all perhaps 50,000 men fell, among whom was Marshal Lannes, and the French were driven back into their island. Once more, however, Napoleon's skill and fortune prevailed. On the night of July 4th he succeeded, under cover of a false attack, in throwing six bridges from Lobau to the left bank of the Danube, over which more than 100,000 men passed before morning and were arrayed upon the Marchfeld. The obstinate battle of Wagram followed, in which by a miscalculation which became the subject of much controversy, the archduke John came too late to his brother's help.

What was expected in Germany had happened already in the Peninsula. Arthur Wellesley had landed at Lisbon on April 22d, and in less than a month had driven Soult in confusion out of Portugal. In July he undertook an invasion of Spain by the valley of the Tagus. Thus both the quantity and quality of resistance to Napoleon was greater than at any former time; but it was scattered, and the question was whether it could concentrate itself.

But England was unfortunate this time in her intervention. The armament did not set sail till August, when in Austria the war seemed to be at an end, and when Wellesley, after winning the battle of Talavera, had seen himself obliged to retire into Portugal, and it was directed not to Germany but against Antwerp. It was therefore a mere diversion, and as such it proved unsuccessful.

And so the last triumph of Napoleon was achieved, and the treaty of Schönbrunn was signed on October 20th. By this treaty, as by former treaties, he did not merely end a war or annex territory, but developed his empire and gave it a new character. He now brought to an end the diumvirate which had been established at Tilsit. Since Tilsit his greatness had been dependent on the concert of Russia. He had had the czar's permission to seize Spain, the czar's coöperation in humbling Austria. But he could not thus discard Russia without making her an enemy, and accordingly the Russian war appeared on the horizon at the very moment that the Austrian war was terminated. This transformation was accomplished by first humbling Austria, and then, as it were, adopting her and giving her a favored place in the European confederacy. She lost population to the amount of 3,500,000, besides her access to the sea; she paid an indemnity of more than \$15,000,000, and engaged to reduce her army to 150,000. But, thus humbled, a high and unique honor was reserved for her. We cannot be quite certain whether it was part of Napoleon's original plan to claim the hand of an archduchess, though this seems likely, since Napoleon would hardly break with Russia unless he felt secure of the alliance of Austria, and yet in the treaty of Schönbrunn he does not hesitate to offend Russia by raising the Polish question. What is certain is that after his return to France Napoleon proceeded at once to the divorce from Josephine, that at the same time he asked the czar for the hand of his sister, that upon this Austria, alarmed, and seeing her own doom in the Russian match, gave him to

understand (as he may very well have calculated that she would do) that he might have an archduchess, and that upon this he extricated himself from his engagement to the czar with a rudeness which might seem intended to make him an enemy. At the same time he refused to enter into an engagement not to raise the Polish question.

At an earlier period we saw Napoleon urged by his brothers to divorce Josephine, but refusing steadfastly and apparently resolved upon adopting the eldest son of Louis and Hortense. He had now quite ceased to be influenced by his brothers, but at the same time he had risen to such greatness that he had himself come to think differently of the question.

The archduchess Marie Louise, who now ventured to take the seat of Marie Antoinette, seems to have been of amiable but quite insignificant character. Her letters were childlike. She became a complete Frenchwoman, but, owing to a certain reserve of manner, was never specially popular. On March 20, 1811, she bore a son, who took the title of King of Rome, by which in the Holy Roman Empire the successor had been designated. France had thus become once more as monarchical as in the proudest days of Versailles; but the child of the empire was reserved for what his father called "the saddest of fates, the fate of Astyanax."

As in 1805 Napoleon had brought Austria and Russia on himself by attacking England, so in 1810 he pressed his hostility to England to the point that it broke the alliance of Tilsit and led to a Russian war.

The year 1810 was occupied with this heightening of the Continental system and the annexations which it involved. That he had long contemplated the annexation of Holland appears from the offer of the crown of Spain which he made to Louis in 1808, and the language he then used. He now took advantage of the resistance which Louis made to his ruinous exactions. Louis was driven to abdicate, and the country was organized in nine French departments. In August the troops of the king of Westphalia were forced to make way for French troops at the mouths of the Elbe and Weser, and a few months later the whole coast between the Rhine and the Elbe was annexed. At the same time Napoleon began to make war on neutral commerce, especially American, affirming that in order to complete the destruction of English trade it was only necessary to prohibit it when it made use of neutral bottoms. So thoroughly in earnest was he with his Continental system; and indeed it is beyond dispute that great distress and discontent, nay, at last a war with the United States, were inflicted upon England by this policy.

But the pressure of it was felt even more on the Continent, and the ultimate cause of the fall of Napoleon was this, that under the weight of the Continental system the alliance of Tilsit broke down sooner than the resistance of England. That alliance had been seriously weakened by the Austrian marriage, and by Napoleon's refusal to give the guarantees which Russia required that Poland should never be restored.

In 1811 the alliance of Tilsit gradually dissolved. Napoleon's Russian expedition is hardly to be regarded as a freak of insane pride. He himself regarded it as the unfortunate effect of a fatality, and he betrayed throughout an unwonted reluctance and perplexity. The truth is, he could not now stop. Upon the Continental system he had staked everything. He had united all Europe in the crusade against England, and no state, least of all such a state as Russia, could withdraw from the system without practically joining England. For an ordinary war his resources were greatly superior to those of Russia. A campaign on the Lithuanian frontier

would no doubt have been unfavorable to Alexander, and might have forced him to concede the points at issue. Napoleon had already experienced in Spain the danger of rousing national spirit. It seems, however, that this lesson had been lost on him, and that he still lived in the ideas which the campaigns of 1805, 1806, and 1807 had awakened, when he had occupied Vienna and Berlin in succession, overthrown the Holy Roman Empire, and conquered Prussia. He made a dispute about tariffs the ground of the greatest military expedition known to authentic history. War with France meant for Russia sooner or later alliance with England, but Napoleon was not able to get the help of Turkey, and Sweden joined Russia. Against Russia, Sweden, and England (a coalition which formed itself but tardily) Napoleon assembled the forces of France, Italy, and Germany, and hoped to win, as usual, by the rapid concentration of an overwhelming force. The army with which he invaded Russia consisted of somewhat more than 600,000 men—the French troops mainly commanded by Davoust, Oudinot, and Ney, the Italian troops by Prince Eugène, the Poles by Poniatowski, the Austrian contingent (33,000 men) by Schwarzenberg, the remaining German troops by Gouvion St. Cyr, Reynier, Vandamme, Victor, Macdonald (who had the Prussian contingent), and Augereau.

Russia had been easily defeated at Austerlitz and Friedland, where it fought far from home for a cause in which it was but slightly interested. Against an invasion it was as invincible as Spain, being strengthened by a profound national religion and perfect loyalty to the Government; in addition it had the strength of its vast extent, its rigorous climate, and the half-nomad habits of its people. By his prodigious preparations Napoleon provoked a new national war under the most difficult circumstances, and yet he appears to have desired peace and to have advanced most reluctantly. His campaign ran the same course as against Austria in 1805 and 1809. There was the successful advance, the capture of the fortress (Smolensk), the great victory (at Borodino), the entry into the capital (Moscow); but of all this no result. No negotiation followed, and Napoleon suddenly found himself helpless, as perhaps he would have done in 1805 and 1809, had the enemy shown the same firmness. On May 16, 1812, he arrived with Marie Louise at Dresden, where for the last time he appeared as king of kings—the emperor of Austria, the king of Prussia, a multitude of German sovereigns, Metternich, and Hardenberg paying court to him. On the 28th he set out again and traveled by Glogau, Thorn, Dantzic, Königsberg, Gumbinnen, to Wilkowyski, where he arrived on June 21st. On the 24th the mass of the army passed the Niemen at Kovno, and on the 28th Napoleon entered Vilna, which was evacuated by the Russians. Here he remained till July 16th. Alexander, who had by this time gained greatly in decision of character, refused to negotiate while the enemy stood on Russian territory; Napoleon in conversation with Balacheff showed an almost pathetic desire for an amicable arrangement. He was embarrassed again when a deputation from Warsaw, where a diet had met, asked him only to say that "*Poland exists*, since his decree would be for the world equivalent to the reality." This word he declined to say, alleging his obligations to Austria. From his conversations with Narbonne (Villemain, *Souvenirs*) we find that he had deliberately considered and rejected what we may call the rational mode of waging war with Russia, that is, through the restoration of Poland.

In relating this war we have to beware of national exaggerations on both sides. On Napoleon's side it is absurdly said that he was only vanquished by winter,

whereas it is evident that he brought the winter upon himself, first by beginning so late, then by repeated delays, at Vilna, at Vitebsk, and most of all at Moscow. On the other side we must not admit absolutely the Russian story that he was lured onward by a Parthian policy, and that Moscow was sacrificed by a solemn universal act of patriotism. As usual Napoleon took the enemy by surprise, and brought an overwhelming force to the critical point. When he crossed the Niemen the Russians were still thinking of an offensive war, and rumors had also been spread that he would enter Volhynia. Hence their force was divided into three armies: one, commanded by the Livonian Barclay de Tolly, had its headquarters at Vilna, a second under Prince Bagration was further south at Volkowysk, the third under Tormaseff was in Volhynia. But the total of these armies scarcely amounted to 200,000 men, and that of Barclay de Tolly opposed little more than 100,000 to the main body of Napoleon's host, which amounted nearly to 300,000. Barclay was a German, and might well seem another Melas or Mack. A cry arose for his dismissal, to which the czar responded by putting old Kutusoff, who was at least a Russian, at the head of all his armies. This change necessarily brought on a great battle, which took place on September 6th near the village of Borodino. More than 100,000 men and about 600 pieces of artillery were engaged on each side. It ended in a victory, but an almost fruitless victory, for the French. They lost perhaps 30,000 men, including Generals Monthlon and Caulaincourt, the Russians nearly 50,000, including Prince Bagration. Here again Napoleon displayed unwonted indecision. He refused to let loose his guard, consisting of 20,000 fresh troops, who might apparently have effected the complete dissolution of the hostile army, and materially altered the whole sequel of the campaign. He said, "At 800 leagues from Paris one must not risk one's last reserve."

This battle, the greatest after Leipsic of all the Napoleonic battles, was followed by the occupation of Moscow on September 14th, which, to Napoleon's great disappointment, was found almost entirely empty. After a council of war held at Fili, Kutusoff had taken the resolution to abandon the old capital, the loss of which was held not to be so irreparable as the loss of the army. But, as with Old Russian craft he had announced Borodino to the emperor as a victory, the sensation produced upon the Russian public by the fall of Moscow was all the more overwhelming. Nor did the next occurrence, which immediately followed, at first bring any relief. Fires broke out in Moscow on the night after Napoleon's entrance; on the next night, by which time he was quartered in the Kremlin, the greater part of the city was in flames, and on the day following he was forced by the progress of the conflagration to evacuate the Kremlin again.

It is indeed not clear that this event had any decisive influence upon the result of the war. Nor does it seem to have been the deliberate work of the patriotism of Moscow. The beginner of it was one man, Count Rostopchin, governor of Moscow, who is shown by many public utterances to have brooded for some time over the thought, and is proved to have made preparations for carrying it into effect before leaving the town. It is, however, supposed that what was begun by him was completed by a rabble which had no object but plunder, and partly by French soldiers. After planning a demonstration on St. Petersburg, weighing Daru's scheme of wintering in Moscow (which he called "*un conseil de lion*"), and waiting in vain for the czar's submission, Napoleon set out on October 18th after blowing up the Kremlin. He marched southward to Kaluga, hoping to make his way through a richer and unexhausted

country. But while his force had dwindled the Russian had increased. Peace with Sweden had released a Russian force in Finland; peace with Turkey released the army of the Danube; meanwhile levies were proceeding through the whole empire. He reached Smolensk on November 9th, when he might have been at Vilna. He marched by Orcha to the Berezina, which he struck near Borisoff. Here Tchitchagoff at the head of the Danube army confronted him, and two other Russian armies were approaching. Napoleon on his side was joined by what remained of the corps of Oudinot and Victor, who had held the line of the Dwina. But what was the army of Napoleon which was thus reënforced?

In July it had consisted of more than 250,000 men. It had suffered no decisive defeat, and yet it amounted now only to 12,000; in the retreat from Moscow alone about 90,000 had been lost. The force which now joined it amounted to 18,000, and Napoleon's star had still influence enough to enable him to make his way across the Berezina, and so escape total ruin and captivity. But December came on, and the cold was more terrible than ever. On the evening of December 6th a miserable throng, like a crowd of beggars, tottered into Vilna.

The corps of Macdonald, Reynier, and Schwarzenberg (among whom were included the Austrian and Prussian contingents) had escaped destruction, having been posted partly on the Polish frontier, partly in the Baltic provinces. For these we may deduct 100,000 from the total force; it then appears that half a million had perished or disappeared. They had perished not by unexpected cold; "the cold had but finished the work of dissolution and death almost accomplished by the enemy, by hardship, and especially by hunger;" nor is cold unusual in Russia in November. Napoleon's error was one which may be traced as clearly in the campaigns of 1805 and 1806, the error of making no provision whatever for the case of ill-success or even success less than complete. The campaign of 1812 left everything in civilized history far behind it.

But what was Napoleon's position? Any government but the strongest would have sunk under such a blow, but Napoleon's government was the strongest, and at its strongest moment. Opposition had long been dead; public opinion was paralyzed; no immediate rising was to be feared. Should he then simply take the lesson home, and make peace with Alexander? This was impossible; he must efface the disaster by new triumphs. But, as this was evident to all, Alexander could not but perceive that he must not lose a moment, but must hasten forward and rouse Germany before Napoleon should have had time to levy a new army. 1813 must be filled with a war in Germany, as 1812 with the war in Russia.

Napoleon left the wreck of his army at Smorgoni on December 5th (as he had left his Egyptian army thirteen years before), traveling in a carriage placed upon a sledge and accompanied by Caulaincourt and Duroc. He had an interview with Maret outside Vilna, and then traveled to Warsaw, where he saw his ambassador De Pradt, who has left an account of his confused talk. From Warsaw he passed to Dresden, where he saw his ally the king of Saxony, and wrote letters to the emperor of Austria, and to the king of Prussia. He then made his way by Erfurt and Mainz to Paris, where he arrived on December 18th. The bulletin had appeared two days before.

He had said to De Pradt that he intended to raise 300,000 men and be on the Niemen again in the spring. The first part of this intention he fulfilled, for in April he reappeared in the field with 300,000 men; but the

campaign was fought not on the line of the Niemen, nor of the Vistula, nor of the Oder, and he had to fight a battle before he could even reach the Elbe, for a great event took place less than a fortnight after his arrival in Paris, the defection of the Prussian contingent under York from the grand army. This event led to the rising of Prussia against Napoleon. York's convention with the Russians is dated December 30th. On January 22, 1813, Stein appeared at Königsberg and procured the assembling of the estates of East Prussia, in which assembly the Prussian landwehr was set on foot. On February 27th he concluded for the czar the treaty of Kalisch with Prussia, by which the old Coalition of 1806 may be said to have been revived. Prussia now rushed to arms in a wholly new spirit, emulating Spain and Russia in devotion, and adding to devotion an intelligence peculiar to herself. At the same time measures were taken to break up the Confederation of the Rhine. Tattenborn cleared the French out of the northern departments in March; Saxony, too, passed into the hands of the allies, and it was hoped that the king himself might be induced to follow the example of the king of Prussia. But April came, and Napoleon took the field again.

By rapidity and energy he was still able to take the offensive. Though Russia and Prussia were now as Spain, yet the process of calling out and drilling their population was only just begun, and it proceeded slowly. Their united available force at the opening of the campaign scarcely exceeded 100,000 men. Austria and the middle states did not abandon Napoleon. With tact and with judicious concession he might yet retrieve his position; perhaps no one, as yet, had begun to think of his fall. He left Paris for Mainz on April 15th. His object was Saxony, where Dresden, the scene of his last display of omnipotence less than a year ago, was now the residence of the czar and the king of Prussia united against him. Eugène was maintaining himself on the lower Saale with an army of about 70,000 men, and Napoleon was to march by way of Erfurt to join him. Between Erfurt, Bamberg, and Mainz he had by this time about 150,000 men, troops indeed without discipline and with imperfect drill, youths, the last hope of France; but well officered and not wanting in the enthusiasm which his name still inspired. There was, however, a serious deficiency of cavalry. Meanwhile Davoust, stationed on the Weser with 30,000 men, was holding down the insurrection of North Germany.

The war which now commenced ended not only to the disadvantage of Napoleon, but unlike any former war it ended in a complete defeat of France, nay, in the conquest of France, an event to which nothing parallel had been seen in modern Europe. Meanwhile we remark that the war, though technically one, was really three distinct wars. There was first the war with Russia and Prussia which occupied the month of May, and was concluded by an armistice on June 4th. There was next a war with Russia, Prussia, and Austria, which began in August and was practically terminated in October by the expulsion of Napoleon from Germany. Thirdly, there was an invasion of France by the same allied powers. This began in January, 1814, and ended in April with the fall of Napoleon.

In the first of these wars Napoleon maintained on the whole his old superiority. It has excited needless admiration that with his raw levies he should still have been able to win victories, since of his two enemies Russia had suffered as much as himself in 1812, and Prussia's army was at the beginning of the year actually to make. In the first days of May he advanced down the valley of the Saale, making for Leipsic by Naumburg, Weissenfels, and Lützen. On the 2nd was fought

the battle commonly called from Lützen, though the Germans usually name it from the village of Gross-Görschen. By this battle, in which the great military reformer of Prussia, Scharnhorst, received the wound of which he died soon after, the allies were driven to retreat across the Elbe, and Dresden was restored to the king of Saxony. Another battle was fought on May 20th and 21st at Bautzen on the Spree. Here again Napoleon remained master of the field, though his loss seems to have been considerably greater than that of the enemy. The allies retired into Silesia, and a pause took place, which led to the armistice of Poischwitz, signed on June 4th. During this armistice Napoleon formed the resolution which led to his downfall.

He might seem now to have almost retrieved his losses. If he could not revive the great army of the Revolution which lay buried (or unburied) in Russia, he had reasserted the ascendancy of France. Politically he had suffered but one substantial loss, in the rebellion of Prussia.

At Tilsit Napoleon had dissolved the Coalition by forming as it were a partnership with Russia. It might seem possible now to form a similar partnership with Austria. This course had indeed been entered upon at the marriage of the archduchess. Napoleon seems to have taken this alliance seriously. He conceived it as the final suppression of the Revolution, as a complete adhesion on his own part to conservatism. The language of the bulletins at this time is ultra-conservative. Thus the enemy is described as "preaching anarchy and insurrection." Stein is charged with "rousing the rabble against the proprietors." But, though he had borrowed the Austrian tone, he had not yet enlisted Austrian interests on his side. The legerdemain by which, in 1800, 1805, 1806, Napoleon had made conquests was now worn out; his blows were no longer followed by abject submission and surrender; he was not even able, for want of cavalry, to make his victories decisive. Thus ample concessions to Austria were indispensable, but, these assumed, his position might seem good.

He took the momentous resolution to make no such concessions, saw Austria join the Coalition, and after a campaign of two months found himself driven in tumultuous ruin across the Rhine. This step is the counterpart of Tilsit, and destroyed the work of Tilsit. A treaty had just been signed at Reichenbach by which Austria had engaged, as mediating power, formally to offer conditions of peace to Napoleon and to declare war on him in case of refusal. She proceeded to offer the conditions above mentioned with the exception of that which refers to the Confederation of the Rhine. A congress met at Prague in the course of July, but Napoleon did not allow its deliberations to make serious progress. He paid no attention to an ultimatum presented on August 8th. On midnight of August 10-11, the armistice was declared to be at an end, and the doom of Napoleon was sealed.

Europe now plunged again into a struggle as desperate and as destructive as that of 1812. More evidently even than in 1812 was Napoleon responsible for this ruin of all civilization. He could not any longer speak even of the liberty of the seas, for he was forced himself to admit that the Continental system was dead, and yet refused to surrender that ascendancy for which the Continental system had all along been the pretext. Infatuated France, however, had by this time furnished more than 400,000 men to perish in a contest where there might be chances, but could be no probabilities of victory. His headquarters were now at Dresden, and his armies ranged along the whole course of the Elbe

from Bohemia to its mouth. This position had been somewhat weakened by the adhesion of Austria to the Coalition, for Austria massed her troops on the north-west of Bohemia, threatening Dresden and Napoleon's communications from the left side of the Elbe. The force of the allies (approaching 500,000 men) consisted of three great armies, of which the first, principally Austrian, and commanded by Prince Schwarzenberg, was stationed on the Eger in Bohemia; the sovereigns were there. The old Prusso-Russian army, which had made the convention of Poischwitz, was still in Silesia. It contained more Russians than Prussians, but a Prussian officer was now put at the head of it. This was Blücher, the dashing general of hussars, now an old man of seventy years; on his staff were some of the leading theorists and enthusiasts of the new Prussian army, such as Gneisenau. But the bulk of the Prussian force were stationed in the mark of Brandenburg. In this final muster of the armies of Europe we see that the moral forces had passed over from France to the allies. In the French camp there reigned weariness and desire for peace, among the Prussians and Russians heroic ardor and devotion. But the old mismanagement reappeared on the side of the allies.

The campaign opened with a blow aimed at Berlin, where perhaps Napoleon wished to extinguish the popular insurrection at its source. Oudinot marched on it from Baruth, and was supported by a force from Magdeburg; Davoust sent another corps from Hamburg. Bernadotte proposed to retire and sacrifice Berlin, but in spite of him Bülow fought on August 23d the battle of Grossbeeren, within a few miles of the capital. Here first the landwehr distinguished itself, and Berlin was saved. The attack from Magdeburg was defeated by Hirschfeld at Hagelberg on the 27th. Meanwhile Napoleon himself, at the head of 150,000 men, had marched against Blücher on the Katzbach. Blücher retired before him, and he was compelled to return to the defense of Dresden, but he left Macdonald with perhaps 50,000 or 60,000 men to hold Blücher in check. Almost immediately after his departure (August 26th) Macdonald was defeated by Blücher in the battle of the Katzbach. Thus the campaign began with two Prussian victories. But when the great army of Bohemia moved upon Dresden Napoleon showed his old superiority. On August 27th he inflicted on it a terrible defeat. In this battle Moreau, the hero of Hohenlinden, was mortally wounded by a cannon-ball. It seemed for a moment likely that this battle, followed up with Napoleon's overwhelming rapidity, would decide the campaign. But the news of Grossbeeren and Katzbach arrived; Napoleon is also said to have been attacked by illness; he altered his plan in the moment of execution. The grand stroke of the campaign failed, and, instead of cutting off the retreat of the grand army, Vandamme was taken prisoner at Kulm with 10,000 men after a battle in which he had lost half that number (August 30th). It was evident that the times of Marengo and Austerlitz were over. Napoleon's ability and authority were as great as ever; he controlled larger armies; he opposed a Coalition which was as unwieldy as former Coalitions; and yet he had suffered four defeats in a single week and had won but one victory. Within another week he suffered another blow. A new advance was made on Berlin by Ney, who was defeated with great loss at Dennewitz by the Prussians under Bülow (September 6th).

Here then ended Napoleon's ascendancy; henceforth he fought in self-defense or in despair. Yet the massacre was to continue with unabated fury for two months longer. He spent the greater part of September in

restless marches from Dresden, now into Silesia, now into Bohemia, by which he wore out his strength without winning any substantial advantage. Toward the end of the month a new phase of the war began. From the beginning the allies had given each other rendezvous in the plain of Leipsic. Hitherto Napoleon had held the line of the Elbe, and had presented a single mass to the three separate armies of the Coalition. Now that his collapse began to be visible, began the converging advance on Leipsic. The Silesian army crossed the Elbe at Wartenburg on October 3d, and on the next days the northern army also crossed at several points. At the same moment the Confederation of the Rhine began rapidly to dissolve. A troop of Cossacks under Czernicheff upset the kingdom of Westphalia (October 1st). Bavaria abandoned Napoleon, and concluded the treaty of Ried with Austria (October 8th). But for form's sake a final massacre was still necessary. It took place on a satisfactory scale between October 14th and 19th, and ended in the decisive defeat of Napoleon and the capture of Leipsic. Perhaps nearly half a million of men were engaged in these final battles. It is reckoned that in the last three days the Prussians lost 16,000, the Russians 21,000 and the Austrians 14,000 men—total, 51,000. Napoleon left 23,000 behind him in the hospitals and 15,000 prisoners; his dead may have been 15,000. He lost also 300 pieces of artillery. The sufferings of the wounded almost exceeded anything told of the retreat from Moscow.

The work of eight years was undone; Napoleon was thrown back to the position he had occupied at the rupture of the peace of Amiens. The Russian disasters had canceled Friedland; Leipsic had canceled Austerlitz. But he might by abdicating have spared France, already mortally exhausted, the burden of another war. It is among the most unpardonable even of his crimes to have dragged his unhappy country through yet another period of massacre, though nothing that could even appear to be a national interest was at stake. In November advances were made to him by the allies, in which peace was proposed on the basis of the "natural frontiers." This would have secured to France the main fruits of the First Revolutionary War, that is, Belgium, the Left Bank, Savoy, and Nice. Such terms seem generous when we consider the prostration of France and the overwhelming superiority of the allies.

On December 1st, the allies issued their manifesto from Frankfort, in which they declared themselves at war not with France but with Napoleon (an imitation of the Revolutionary principle, "Peace with peoples, war with Governments"), and the invasion followed with almost Napoleonic rapidity. The three armies remained separate as they had been in Germany. The great army under Schwarzenberg passed through Switzerland, and made its way to the plateau of Langres (the source of the Seine, Aube, and Marne), where it began to arrive about the middle of January; Blücher's Silesian army crossed the middle Rhine to Nancy; the northern army, nominally under Bernadotte, passed through Holland. In the course of the march Switzerland and Holland were swept into the Coalition, the resources of which were become overwhelming. It would be difficult to state for what object Napoleon now called on France to fight another campaign, particularly as the allies guaranteed to her a larger territory than she had possessed under the old monarchy. His officers indeed wondered what personal object he could have. They were astonished to hear him talk of another campaign in Germany to be undertaken next spring, of being soon on the Vistula again, etc.

He was no doubt a prey to illusions, his fortune having accustomed him to expect results ten times greater than the probabilities justified, but his confidence was founded on (1) the great force which still remained to him shut up in German fortresses, (2) the mutual jealousy of the allies, (3) his own connection with the emperor of Austria, (4) the patriotism which would be roused among the French, as in 1792, by the invasion. But his calculations were confounded by the rapidity of the invaders, who gave him no time to call out the nation. The Senate did indeed grant him 300,000 men, but to levy, drill, and arm them was impossible, and he had neglected to fortify Paris. In the armies which had returned from Germany there began desertion of all who were not French. The campaign opened at the end of January and was over at the end of March. The scene of it was the country between the Marne, Aube, and Seine, partly also the department of Aisne. At first, though successful at Brienne, Napoleon seemed unable to resist the superior numbers of the enemy. He was defeated at La Rothière. But the invaders were as yet irresolute; they divided their forces. This gave him an opportunity. He attacked Blücher, and, though with greatly inferior forces, won four battles in four days, at Champaubert (February 10th), at Montmirail (11th), at Château-Thierry (12th), at Vauchamps (13th). For the moment this brilliant success gave the campaign quite another character; the hopes and patriotic feelings of the French were roused. A congress had already been opened at Châtillon, and under the impression of these victories it would have been easy to conclude a peace, had not Napoleon's position made a reasonable peace inadmissible to him. He felt this, and fell back upon illusions and upon attempts to sever Austria from the Coalition. At the beginning of March the Coalition was strengthened by the treaty of Chaumont, in which each of the four powers bound themselves for twenty years to keep 150,000 men on foot. Directly afterward Napoleon received a crushing blow from the fall of Soissons and the junction of Blücher with the northern army under Bülow, which had entered France by way of Holland and Belgium. Their united force amounted to more than 100,000 men. The battles of Craonne and Laon followed, in which Napoleon, without suffering actual defeat, saw his resources dwindle away. On March 18th the conference at Châtillon came to an end, the plenipotentiaries of the allies declaring Napoleon to have no intention but that of gaining time. About the 24th the allies came to the resolution to march on Paris. They had before them only Marmont and Mortier, for Napoleon himself had resolved to maneuver in their rear, and had marched to St. Dizier. The marshals, after an engagement at Fère Champenoise, made good their retreat to Paris, where the enemy followed them on the 29th. Joseph Bonaparte withdrew Marie Louise and the king of Rome to Tours. On the 30th the allies attacked in three divisions—the Silesian army on the side of Montmartre, Prince Eugene of Würtemberg and Barclay de Tolly by Pantin and Romainville, the crown prince of Würtemberg and Giulay by Vincennes and Charenton. In the afternoon, after an obstinate resistance, the marshals offered a capitulation, and engaged to evacuate the town before seven o'clock in the morning. Napoleon, advancing by forced marches, was too late. The military struggle was over; the political struggle began.

But not even the germs were visible of any authority that could replace that of Napoleon. Should he be succeeded by another general, or by a regency for his son, or by the Bourbons? The first course might have been possible had some Moreau been at hand;

even as it was, Bernadotte, who, like Napoleon, was a Jacobin developed into a prince, made pretensions which were favored by the czar. Such a course would have been a revival of the consulate, but it would not have satisfied the republican party, while it would have been rejected by monarchists of every shade. In favor of the regency, as against the Bourbons, there was much to be said. It would not begin with a fantastic transformation scene, and it would have a hold on the popular imagination. The decision fell out by a sort of accident. To a regency the natural road was by an abdication which would preserve the principle of inheritance. Such an abdication Napoleon gave. On April 4th he reviewed his troops at Fontainebleau, and announced his intention of attacking the allies in Paris. They received his words with enthusiasm; but just at this point the mainstay of his power failed him. The military aristocracy, the marshals, refused to follow him, and Napoleon perceived in a moment that the end was come. Though in arguing with them he had said that a regency of Marie Louise, whom he called "a child," was impossible, yet he now abdicated on condition that his son should succeed under the regency of the empress. Ney, Macdonald, and Caulaincourt set out for Paris to negotiate the establishment of the regency.

While the marshals forced him to abdicate, his reign had been brought to an end in a wholly different way by the Senate. Talleyrand, vice-president of this body, who had for some time been intriguing in favor of the Bourbons, pronounced openly in favor of them before the sovereigns when they entered Paris. He convoked the Senate on April 1st, and on April 2d it voted the deposition of Napoleon and his family. This decision was ratified the next day by the Corps Législatif.

Then occurred the abdication in favor of his family, which had the support of the army. The instrument was brought to Paris by not less than three famous marshals, Ney and Macdonald having been joined on their way from Fontainebleau by Marmont. The two solutions were thus brought together before the allied sovereigns, of whom Alexander was not favorably disposed to the Bourbons, and Francis was the father of Marie Louise. For a moment the balance trembled.

But Marmont had been brought into contact, during his defense of Paris, with Talleyrand, and had committed himself to him before he knew of the view of the marshals. After evacuating Paris he had been stationed on the Essonne. Here he had entered into an engagement to place his corps at the service of the new provisional government which the Senate had constituted; the arrangement was that on April 5th the corps should quit its position and march into Normandy. But when the marshals passing through his camp from Fontainebleau told him of their commission, he had revealed his secret with expressions of penitence; he had countermanded his orders to the inferior officers and had gone with the marshals to Paris. In his absence, however, General Souham, influenced by a fear that the plot had become known to Napoleon, gave orders to the troops to march on to Versailles. This appearance of division in the army was fatal to Napoleon's family. It decided Alexander to declare for the Bourbons, and Caulaincourt was instructed to demand from Napoleon an abdication pure and simple. In return he was to retain the title of emperor, and to have the island of Elba in sovereignty, while Marie Louise was to have a principality in Italy.

By an irony of fortune the government founded at Brumaire, in which everything had been sacrificed to military efficiency, was the only one of the three governments of France since 1789 which actually suc-

cumbed before an invader. The total result of so many conquests was that France, which, when Napoleon's name was first heard of, was in substantial possession of Belgium, the left bank of the Rhine, Savoy, and Nice, had now lost the first two acquisitions; and we shall see what measures he took to deprive her of the other two.

In the meantime, however, all the hatred, long suppressed, of individuals and of parties broke loose upon him. For the moment he seems to have utterly lost heart. On the night of April 11th, after signing the unconditional abdication, he is said to have taken a dose of a poison which ever since the Russian campaign he had kept by him. But vomiting, we are told, came on and saved him. On the 20th, when he bade farewell to his soldiers, he had resolved to live in order "to narrate to posterity the great deeds we have done together." He soon found another object for life; but a year later, after another downfall far more complete and ignominious, he clung to life, and he clung to it afterward in captivity. The soldiers idolized him still, and his parting scene at Fontainebleau, when he kissed the eagle, was pathetic; but when he reached the south of France he met with other demonstrations of feeling. At Avignon and Orgon the crowd attacked the carriages, and wanted to throw the tyrant into the Rhone. He was compelled to disguise himself. At the coast he was met by an English frigate which landed him on May 4th at Porto Ferrario, in Elba. It seems to have been arranged among the sovereigns that his wife and child were not to rejoin him, nor did he complain of this. Marie Louise set out on April 23d, and was at Schönbrunn again before the end of May. About the same time Josephine died at Malmaison, in the arms of her children Eugene and Hortense.

It must have occurred to Napoleon very soon after his arrival in Elba that he was not yet driven to autobiography. Never was a great state in a position so untenable and monstrous as France after he quitted the helm. In twenty years of thrilling events, in the emotions first of tragedy and then of epic poetry, the French had forgotten the Bourbon court, when suddenly the old Comte de Provence (under the name of Louis XVIII.) and the Comte d'Artois, Condé and the Duc d'Angoulême, and the Orpheline du Temple, reappeared and took possession of the country before even a royalist party had formed itself in France. Politically, indeed, they brought liberty, for they created a parliament where all assemblies had been mute and servile for fourteen years; but they unsettled all domestic affairs, the position of public men, the prospects of the army, the title of estates, in a manner so sudden and intolerable, and that at a moment when the country had suffered conquest from without, that some new convulsion seemed manifestly imminent. Disgraced, bewildered, and alarmed at the same time, the French could think with regret even of the reign of Napoleon. Another event happened which was like a new revolution. The prisoners and the troops shut up in German fortresses returned to France under the treaty, perhaps not less than 300,000 men. What could be more evident than that if all these soldiers could take the field again, and under Napoleon, France might yet escape the humiliation of a government imposed by foreigners, and perhaps also recover her lost frontiers? The congress of Vienna entered upon business in September, and from this time a new chapter of politics opened. France ceased to be the general bugbear, and new alliances began to be formed in order to check the aggressive spirit of Russia.

It was not the first time that Napoleon had gone into a sort of exile. As he had disappeared in the East,

and returned to make Brumaire, so he might come from Elba to rescue France. The situation was not less intolerable than 1799. As then, so now, had he not returned, a revolution would, nevertheless, have taken place. Fouché was weaving a military plot, which would have carried to power perhaps the duke of Orleans, perhaps the king of Rome.

Napoleon entered upon the last of his thousand adventures on February 20, 1815, when he set sail from Porto Ferraio with Generals Bertrand and Drouot and 1,100 soldiers. On March 1st, he reached the French coast between Cannes and Antibes. Twenty days after he entered the Tuileries in triumph.

He had judged the feeling of the army correctly, and also the effect which would be produced by his prodigious fame. These causes were more than enough to overthrow a government so totally without root as that of the Bourbons. From the coast he took the way across the mountains of Provence by Sisteron and Gap to Grenoble. The soldiers sent from this town to stop him were disarmed when he uncovered his breast and asked, Which of them would fire on his emperor? He was then joined by the royalist La Bédoyère. Macdonald at Lyons stood firm, but was deserted by his soldiers. Ney, who commanded in the east, at first declared himself violently against his old chief, but the military feeling afterward gained him, and he joined Napoleon at Auxerre. The king left the Tuileries on the 19th, retiring northward, and on the next day Napoleon entered Paris.

At Brumaire he had put down Jacobinism, and given the nation order and repose. Now he was summoned, in the name of liberty, to protect the acquisitions of the Revolution and to defend the national honor against the triumphant foreigner. The Hundred Days are the period of popular or democratic imperialism. Those who sided with him told him frankly that he must turn over a new leaf, and he professed himself ready to do so. It would be rash to say that this was impossible. He was but forty-five; his return from Elba was an astonishing proof that he still possessed that elasticity of spirit, that power of grasping the future, which he had often shown so remarkably. Here then, as at a second Brumaire, might begin a third Napoleonic period. The mad crusade against England and the world-empire which sprang out of it were now to be forgotten; he was to stand out as a hero of national independence and of modern ideas together, a representative of the free modern people against the Holy Alliance. This last and most surprising of his transformations was already most prosperously begun. But at this point fortune deserted him once and for all. Napoleon Liberator remained a poetical idea, transforming his past life into legend, and endowing French politics with a new illusion; the attempt to realize it came to an end in a hundred days (March 13th to June 22d).

The ultimate cause of this failure seems to have been a change in Napoleon himself. It had long been remarked that the emperor Napoleon was wholly different from the general Bonaparte of the Italian campaigns. Bonaparte had been lean, shy, laconic, all fire and spirit, the very type of republican virtue imagined by Rousseau; the emperor was fat and talkative, and had his fits, according to Marmont, of indolent ease. Once or twice there had been attacks of illness, by which he had been temporarily incapacitated; but these had been hushed up. On the whole he had never yet been wanting to himself. In the campaign of 1814 his activity had been prodigious, and the march to Paris in twenty days, with which he had opened 1815, had been a great display of vigor. But he could not maintain himself at this level. A physical decay had begun in him, affect-

ing through his body, not indeed his mind, but his will and his power of application.

The constitutional history of the Hundred Days may be dispatched summarily, since it led to nothing. On March 13th an imperial decree was issued from Lyons dissolving the two chambers established by the Bourbons, and convoking an extraordinary assembly in Field of May for the purpose "of correcting and modifying our constitutions and of assisting at the coronation of the empress, our dear and well-beloved spouse, and of our dear and well-beloved son." But the prospect soon changed, and, as it was necessary that the empire, like the monarchy, should have its charter, it seemed impossible to wait till May. Napoleon had recourse to Benjamin Constant, that is, he marked his change of policy by sending for the leader of the opposition. The "Acte Additionnel aux Constitutions de l'Empire," dated April 22d, was drawn by Constant, examined by a committee, and then adopted by the council of state. The most remarkable feature of it is the preamble, in which he explains his change of attitude by saying that "formerly he had endeavored to organize a grand federal system in Europe, which he had regarded as agreeable to the spirit of the age and favorable to the progress of civilization," that "for this purpose he had adjourned the introduction of free institutions," but that "henceforward he had no other object but to increase the prosperity of France by strengthening public liberty." This neat misrepresentation deserves notice as having imposed on many people. For the rest it is to be observed that this act creates an hereditary peerage. The Field of May was held, but not till June 1. Napoleon appeared in a grand costume and distributed flags, but the "well-beloved spouse and son" were not there; Europe had declared against him. On the 12th he set out for the campaign.

The great powers had issued, immediately on hearing of Napoleon's disembarkation (March 13th), a declaration putting him outside all civil and social relations, and consigning him to public vengeance as "an enemy and disturber of the peace of the world." On March 25th they reconstituted the Coalition. To be freely accepted by the French people, and then to be rejected by Europe, gave him precisely the opportunity he sought as standing forth as the heroic champion of national independence. He had now all the soldiers who at the time of his first fall had been locked up in fortresses or foreign prisons. His position was therefore such as it had been in 1813, not in 1814, and he proposed to defend not a vast empire but simply France, so that he had on his side patriotism and liberalism. For the moment, however, the inequality of numbers was great. In June the allies had in the field more than 700,000, Napoleon little more than 200,000, men. There were already English troops in Belgium, where they were engaged in establishing the new kingdom of the Netherlands, and there were Prussian troops in the Rhenish province which had just been given to Prussia. It was a question for Napoleon whether he should assume a defensive attitude and allow the allies to invade France—this in itself would have suited his new policy best—or carry the war into Belgium, a country long united with France, and attack the English and Prussians. He shrank from inflicting a new invasion upon France, especially on account of the strength of the royalist party in many regions, and thus it was that the scene of the campaign was laid in Belgium. The English had their headquarters at Brussels, the Prussians at Liège. He formed the plan of dividing them and beating them in turn, as he had served the Austrians and Sardinians at the very beginning of his career. Many circumstances, however, were different. Wellington

and Blücher with Gneisenau were superior to Colli and Beaulieu; the Napoleon of 1815 was vastly inferior to the Bonaparte of 1796. Of all the Napoleonic campaigns this was by far the most rapid and decisive. Even the Marengo campaign had lasted a month, but this was decided in three days. Leaving Paris on the 12th, Napoleon was in Paris again on the 21st, his own fate and that of his empire and that of France decided. Everything concurred to make this short struggle the most interesting military occurrence of modern history up to that time: its desperate intensity, its complete decisiveness, the presence for the first and last time of the English army in the front of the European contest, the presence of the three most renowned commanders, Napoleon, Wellington, and Blücher.

Napoleon's army amounted to 122,401 men; it contained a large number of veterans, besides many who had seen the campaigns of 1813-14, and was perhaps the finest army he had ever commanded. That of Wellington was composed of Englishmen, Hanoverians, Brunswickers, Nassauers, Germans, and Netherlanders; the total is stated at 105,950. But in the Netherlanders of the newly-established kingdom no confidence could be placed, and yet these amounted to nearly 30,000; the English, too (about 35,000), were in great part raw recruits (the Peninsular veterans being mainly absent in America); altogether Wellington pronounced it "the worst army ever brought together." The army of Blücher numbered 116,897 disciplined troops, animated by an intensely warlike spirit. Napoleon's opening was prosperous. He maintained so much secrecy and used so much rapidity that he succeeded in throwing himself between the two armies. On the 15th he advanced and occupied Charleroi. On the 16th he engaged the Prussians at Ligny and the English at Quatrebras, desiring to block the cross-road between Quatrebras and Sombreffe, and so to sever the two armies. Napoleon personally commanded against the Prussians, and here he gained his last victory. The battle was very bloody; about 12,000 Prussians fell, and Blücher himself was wounded. At Quatrebras Ney met Wellington and was forced to retreat. But the defeat of Blücher made it necessary for Wellington to retire on Brussels in order to effect a junction with the Prussians. The 17th was spent in this retrograde movement, and on the 18th Wellington accepted battle on the heights of St. Jean, from which the French name it, while the English give it the name of Waterloo, a village four miles nearer to Brussels, where Wellington wrote his dispatch. He accepted battle in full reliance upon the help of the Prussians, who are not, therefore, to be considered as having saved him from defeat.

Military writers point out several errors, some of them considerable, committed by Wellington, but their criticism of Napoleon, which begins by sweeping away a mass of falsehood devised by himself and his admirers in order to throw the blame upon others, is so crushing that it seems to show us Napoleon after his brilliant commencement acting as an indolent and inefficient general. He first, through mere want of energy, allows the Prussians to escape him after Ligny, and then sends Marshal Grouchy with 33,000 men in the wrong direction in pursuit of them. Owing to this mismanagement Grouchy is at Wavre on the day of the battle of Waterloo, fighting a useless battle against the Prussian corps of Thielemann, while Blücher is enabled to keep his engagement to Wellington. Everywhere during these days Napoleon appears negligent, inactive, inaccessible, and rather a Darius than an Alexander, so that it has been plausibly maintained that he was physically incapacitated by illness. The battle itself was one of the most remarkable and terrible ever fought, but it was perhaps

on both sides rather a soldiers' than a generals' battle. It consisted of five distinct attacks on the English position:—(1) an attack on the English right by the division Reille, (2) an attack on the left by the division D'Erlon (here Picton was killed), (3) a grand cavalry attack, where the splendid French cavalry "foamed itself away" upon the English squares, (4) a successful attack by Ney on La Haye Sainte (which Wellington is thought to have too much neglected; it was after this that the French prospect seemed brightest), (5) the charge of the guard. In the middle of the third act of this drama the Prussians began to take part in the action. The battle seems to have begun about 11:30, and about 8 o'clock in the evening the cry "Sauve qui peut" rose from the guard. A general advance of the English decided the victory, and then the pursuit was very thoroughly accomplished by the Prussians under Gneisenau. Napoleon at first took refuge in a square. At Genappe he left this, and arrived at Charleroi about daybreak with an escort of about twenty horsemen.

He lost probably more than 30,000 out of 72,000 men, but the grand army was utterly dissolved. The whole loss of the allies was somewhat more than 22,000. Had Napoleon been victorious, he would but have opened the war prosperously, for half a million soldiers, in addition to those of Wellington and Blücher, were on the march for France; being completely defeated, he had no resource, but was ruined at once. France was conquered, as she had been conquered the year before; but her second fall appears far more humiliating and dismal than her first, when we consider how enthusiastically she had rallied to Napoleon and how instantaneously Napoleon and she had been struck down together. The second abdication took place on June 22d. "I offer myself a sacrifice to the hatred of the enemies of France. My public life is finished, and I proclaim my son emperor of the French." On the 25th he retired to Malmaison, where Josephine had died the year before. When his son was passed over by the Chamber of Representatives, who named an executive commission of five, he protested that he had not intended to make way for a new Directory. On the 27th he went so far as to offer his services once more as general, "regarding myself still as the first soldier of the nation." He was met by a refusal, and left Malmaison on the 29th for Rochefort. He lingered some days at Rochefort, where he had arrived on July 3d, and then, finding it impossible to escape the vigilance of the English cruisers, went on the 15th on board the *Bellerophon* and surrendered himself to Captain Maitland. It was explained to him that no conditions could be accepted, but that he would be "conveyed to England to be received in such manner as the prince regent should deem expedient." He had written at Rochefort the following characteristic letter to the prince regent:—"Royal Highness—A prey to the factions which divide my country and to the enmity of the greatest powers of Europe, I have terminated my public career, and I come, like Themistocles, to seat myself at the hearth of the British people. I place myself under the protection of its laws, which I claim from your royal highness as the most powerful, the most constant, and the most generous of my enemies."

It was perhaps the only course open to him. In France his life could scarcely have been spared, and Blücher talked of executing him on the spot where the Duc d'Enghien had fallen. He therefore could do nothing but what he did. His reference to Themistocles shows that he was conscious of being the worst enemy that England had ever had. Still he might reflect, on the other hand, that England was the only country which had not been trampled down and covered with

massacre by his soldiers. It would have been inexcusable if the English Government had given way to vindictive feelings, especially as they could well afford to be magnanimous, having just won the greatest of all victories. But it was necessary to deprive him of the power of exciting new wars, and the experiment of Elba had shown that this involved depriving him of his liberty. The frenzy which had cost the lives of millions must be checked. This was the principle laid down in the declaration of March 15th, by which he had been excommunicated as a public enemy. It was therefore necessary to impose some restraint upon him. He must be separated from his party and from all the revolutionary party in Europe. So long as he remained in Europe this would involve positive imprisonment. The only arrangement, therefore, which would allow him tolerable personal comfort and enjoyment of life was to send him out of Europe. From these considerations grew the decision of the government to send him to St. Helena. An act of Parliament was passed "for the better detaining in custody Napoleon Bonaparte," and another act for subjecting St. Helena to a special system of government.

He was kept on board the *Bellerophon* till August 4th, when he was transferred to the *Northumberland*. On October 15th, he arrived at St. Helena, accompanied by Counts Montholon, Las Cases, and Bertrand, with their families, General Gourgaud, and a number of servants. In April, 1816, arrived Sir Hudson Lowe, an officer who had been knighted for bringing the news of the capture of Paris in 1814, as governor.

The rest of his life, which continued till May 5, 1821, was occupied partly in quarrels with this governor, partly in the task he had undertaken at the time of his first abdication, that of relating his past life. He did not himself write this narrative, nor does it appear that he even dictated it word for word. It is a report made partly by General Gourgaud, partly by Count Montholon, of Napoleon's impassioned recitals; but they assure us that this report, as published, had been read and corrected throughout by him. It gives a tolerably complete account of the period between the siege of Toulon and the battle of Marengo. On the later periods there is little except a memoir on the campaign of 1815, to which the editors of the *Correspondence* have been able to add another on Elba and the Hundred Days.

These memoirs have often been compared to the *Commentaries* of Cæsar, and their value would indeed be priceless if they related to a period imperfectly known. But an age which has abundance of information, and takes history very seriously, is struck particularly by the elaborate falsifications which they contain. A vast number of misstatements, many of them evidently intentional, have been brought home to him, and in several cases he has tried to foist into history apocryphal documents.

Here, as throughout his life, he showed quite a peculiar talent for misrepresentation. He knew that nine readers out of ten take a lucid statement for a true one, and his statements were always lucid, precise, and direct. And thus it has been, and is, particularly difficult to eradicate the Napoleonic legend, which has grown up in the very midst of the nineteenth century, and would perhaps never have been seriously shaken but for the failure of the Second Empire. By looking only at the beginning and end of his career, and by disregarding all the middle of it, an imaginary Napoleon has been obtained who is a republican, not a despot, a lover of liberty, not an authoritarian, a champion of the Revolution, not the destroyer of the Revolution, a hero of independence, not a conqueror, a friend of the people, not a contemner of the people, a man of heart and virtue,

not a ruthless militarist, cynic, and Machiavellian. This illusion led to the restoration of the Napoleonic dynasty in 1851.

Napoleon died of an ulcer in the stomach on May 5, 1821. He was buried at Longwood in St. Helena; but in the reign of Louis Philippe his remains were removed by permission of the English Government to the Invalides at Paris, where a stately dome was erected over the sarcophagus that contains them.

NAPOLEON II. is the name given by Bonapartists to François Charles Joseph, duke of Reichstadt, the son of Napoleon I. and Marie Louise, who was born at Paris, March 20, 1811, and died of laryngeal phthisis at Schönbrunn, near Vienna, July 22, 1832. His empty imperial title is derived from his father's two abdications in his favor in 1814 and 1815. He was created duke of Reichstadt in 1818 by his grandfather, Francis I. of Austria, at whose court he resided after his father's fall.

NAPOLEON III. Louis Napoleon, Emperor of the French, was the younger son of Louis, king of Holland (brother of Napoleon I.), and of Hortense, daughter of the empress Josephine by her first husband Beauharnais. He was thus both nephew and step-grandson of Napoleon I. His father and mother were on the worst terms, and rarely lived together. Louis was born at Paris on April 20, 1808, at the house belonging to his mother in the street that is now Rue Lafitte. He was brought up at Paris, and was occasionally taken to the Tuileries and noticed by the emperor, who gave him the cordon of the Legion of Honor. But it is impossible that the child could have remembered much of Napoleon I., who, from the beginning of the Russian campaign in 1812, was constantly away from Paris. When, in 1814, the allies entered the French capital, generosity toward the conquered was the order of the day. Queen Hortense was courteously treated and visited by the czar Alexander, to whom her boy is said to have given a ring. The family continued to reside in France during the first restoration of the Bourbons, and were there when Napoleon returned from Elba.

The second restoration of the Bourbons was not effected in so gentle a spirit as the first. The family of the Bonapartes was banished from France. Hortense—who, like the rest of her kindred, had enriched herself out of public property—retired to Switzerland, and purchased the chateau of Arenenberg, overlooking the Lake of Constance. The next fifteen years were passed by the young Louis partly at Arenenberg and partly at Augsburg, which his mother chose as the place of his education. He grew up a gentle, studious, brooding youth, and the influence of his Augsburg schooling remained both in his habits of thought and in his German-like pronunciation, which was noticeable long afterward. Until 1830 he attracted little attention from those around him, and none at all from the world, for he was as yet only one among several cadets of the Napoleonic house, Napoleon's own son, the duke of Reichstadt, being still alive. He seems, however, to have had dreams of a great future at an early age; and the instinct that some knowledge of military affairs would be useful to him led him to serve as an artillery volunteer in the Swiss camp of Thun under Colonel Dufour. The revolution of 1830, which dethroned the Bourbons and awoke insurrectionary movements in so many countries, first launched Louis Napoleon upon his eventful career. Along with his elder brother he joined the Italian bands who were in revolt against the rule of the pope in Romagna. This revolt was put down by Austrian soldiers. The elder of the two brothers fell ill and died at Forlì; Hortense, setting out to rescue her sons from their danger, found one dead and the other ill with fever, and on the point of

falling into the hands of the Austrians at Ancona. After nursing Louis through his illness she succeeded in carrying him away in disguise, and the mother and son, after a perilous journey, reached France, which they had not seen for sixteen years. They arrived in Paris in April, 1831; but the law banishing the Bonapartes was still in force, and the Government of Louis Philippe did not allow them to remain there more than twelve days. They were sent on, like other exiles, to England, and stayed for some weeks in London, from which they returned to Arenenberg. Louis, now twenty-three years old, was beginning to form the political theories which the memory of the first empire and the actual state of affairs in France under Louis Philippe naturally suggested to a thoughtful and ambitious mind. A pamphlet called *Political Reveries*, containing the draft of a constitution for France, and an *Essay on Switzerland, Political and Military*, were written by him in 1832-33.

Louis remained quiet for some years in Switzerland, but the death of the duke of Reichstadt in 1832 had made him presumptive head of the house of Bonaparte, his uncle Joseph, the actual head, having no sons; and, in company with some adventurous friends, he formed the design of overthrowing Louis Philippe's government by presenting himself to the army. On October 28, 1836, he came to Strasburg, and, after passing the next day in consultations with Colonel Vaudrey and a few officers who were in the plot, appeared at the quarters of the 4th artillery regiment, which Vaudrey commanded. This regiment welcomed him, and Louis then went on to the infantry barracks, where, however, the enterprise ended disastrously. He was arrested and imprisoned, and, after a short interval, sent to America by Louis Philippe without trial. He had not long been in the United States when he received a letter from his mother stating that she was about to undergo a dangerous operation. He returned to Switzerland in time to see her before her death (October 5, 1837), denying, probably with truth, that he had made any promise to Louis Philippe to remain absent from Europe. A pamphlet on the Strasburg affair, which was now published at his instigation by one of his companions, Lieutenant Laity, led the French ministry to demand his expulsion from Switzerland. The Swiss Government declining to expel him, and, difficulties with France becoming imminent, Louis voluntarily withdrew from the country and went to England. He lived there for the next two years, leading the life of a man of fashion, and associating with persons of prominence in society and on the turf. Among the gayeties of the time in which he took a part was Lord Eglinton's famous tournament. His real interests, however, were of a more serious character, and in the autumn of 1839 he published the treatise *Des Idées Napoléoniennes*, a vigorous but sophistical account of Napoleon's work as an administrator and organizer, and of his foreign policy. This work was intended by its author to prepare the way for a new attempt against Louis Philippe; and in August, 1840, while the body of Napoleon was being brought back from St. Helena, he made his second descent upon France. Above fifty persons assisted him on this occasion, the best-known being Count Montholon, a companion of Napoleon I. in his exile. A ship was chartered, and the conspirators landed at Boulogne, carrying with them a tame eagle. The enterprise had not even the gleam of success which attended the expedition to Strasburg. No one joined them, and within an hour or two those of the party who were not shot or drowned in attempting to escape were lodged in prison. Louis was now brought to trial before the Chamber of Peers, where he was defended

by Berryer. He was condemned to perpetual imprisonment, and the castle of Ham, on the Somme, was chosen as the place of his captivity. For the next six years Louis remained in confinement.

At the end of six years, after asking in vain for permission to visit his father, who was dying, Louis effected his escape, disguising himself with the aid of his faithful friend and fellow-prisoner, Doctor Conneau, as a workman, and walking out of the gates of the castle with a plank over his shoulder (May 25, 1846). He went again to London, and it is characteristic of the life of exile and imprisonment which he had hitherto passed that he heard for the first time a French tragedy performed when Rachel played in London in July, 1846. He was now again in the fashionable world, and he appears to have been compelled to raise large sums of money from money-lenders. The house in which he lived was No. 10 King street, St. James'. In February, 1848, Louis Philippe lost his throne. Louis Napoleon at once set off for Paris, offering his services to the provisional Government. He was, however, requested to withdraw from France, and did so. In April, 1848, during the Chartist disturbances, he was serving in London as a special constable. But his name was kept before the public in France; he was put up for election to the assembly, and was elected at Paris and in three departments. As a Bonapartist movement was now evidently beginning, the executive commission demanded authority to arrest Prince Louis as an avowed pretender. This, however, was refused by the assembly, and it was voted that he should take his seat. Louis, however, had the astuteness to remain in the background until the workmen's insurrection of June was over, declaring himself unwilling to be the cause of any disturbance. The insurrection was put down by Cavaignac, reaction set in, and Louis now appeared upon the scene as the candidate of order and the representative of authority. His first appearance in the assembly was on September 26, 1848; and in December he was elected president of the republic by above 5,000,000 votes, Cavaignac, who was second on the list, receiving 1,500,000, and Lamartine a few thousands. On assuming office he swore in the presence of God to remain faithful to the republic, and to fulfill the duties imposed on him by the constitution. From this time the political history of Louis Napoleon is the history of France.

The principal foreign affair of his presidency was the expedition to Rome, in which, for the sake of anticipating the action of Austria, French troops put down the Roman republic by force, and restored the pope to his sovereignty. Abroad this gained for Louis Napoleon the bitter hostility of Italian patriots, who remembered him as a companion in insurrection against the pope in 1831; and it was one of the many inconsistencies of his position that he was at once a friend of Italian freedom in his heart and yet, as the "man of order" and the "savior of society" in France, dependent to a great extent upon the support of the priesthood. On December 2, 1851, he executed the *coup d'état*, which made an end of constitutional government. Approved at first by an enormous majority of the French people, and even by English public men of the type of Palmerston, this act is now almost universally recognized as a disastrous crime. The sham constitution which was promulgated by the president immediately afterward lasted less than twelve months. In the following November a plebiscite was taken upon the question whether the imperial dignity should be reestablished in the person of Louis Napoleon, and an affirmative answer was given by nearly 8,000,000 voters, against a dissentient minority of 250,000. The empire was inaugurated on the anniversary of the *coup d'état*,

and for eighteen years Louis Napoleon was sovereign of France. The first ten years of his reign were successful, and in some respects brilliant. His marriage with Eugénie de Montijo, countess of Téba (January 30, 1853), placed beside him a figure which long charmed Paris and its visitors. Adhering to the alliance with England which, since 1830, had served France well against the three eastern courts, Napoleon III. entered into war against Russia. He had always represented the restoration of Poland to be one of the tasks left by his uncle to France; and, had his army encountered fewer difficulties in the Crimea, or had the German powers shown any inclination to take part in the struggle against Russia, he would probably have made some serious attempt to restore at least the duchy of Warsaw. But he was no soldier himself; the war proved a serious and embarrassing matter, and in the end Napoleon was far more anxious to make peace than his English ally. The second nationality which associated itself with Napoleonic history, and which had been crushed by the treaties of 1815, was the Italian. Napoleon III. had warning that the cause of Italy could not be safely abandoned. In January, 1858, Orsini attempted to take his life. Whether or not the act of Orsini and the letters which he wrote from prison had the effect of quickening the emperor's determination to do something for Italy may be disputed; but the time had now come, and in the interviews which took place between Napoleon and Cavour at Plombières in the autumn of 1858 the alliance between France and Sardinia against Austria was arranged. In the spring of 1859 French armies entered northern Italy, and the emperor himself took command. On June 4th he witnessed the battle of Magenta, and on the next morning entered Milan in company with Victor Emmanuel. During the battle of Solferino on June 24th, he gave directions from the tower of the church of Castiglione. He met the emperor of Austria at Villafranca on July 11th, and there agreed to those preliminaries of peace which so deeply disappointed the hopes that had been excited by his own words—"Italy free from the Alps to the Adriatic." Venice was left to Austria; Lombardy west of the Mincio alone was liberated; and the subsequent union of the peninsula under the house of Savoy was no work of Napoleon III., whose own plan was to form an Italian federation under the presidency of the pope, and in virtual dependence upon France. Nevertheless the expulsion of Austria from Lombardy was in itself so great a blow that the later effects, though not foreseen by Napoleon, naturally resulted from it.

The annexation of Nice and Savoy to France excited great uneasiness in the British Government, but the treaty of commerce between France and England, which was signed in January, 1860, gave the emperor a popularity in England which he retained even after his fall. With the termination of the Italian war and the inauguration of a policy of free trade the rule of Napoleon III. had reached its best. His ill-judged interference in the affairs of Mexico ended disastrously; the part played by France in reference to the Danish War of 1864 was weak and inconsequent; and when the great struggle between Prussia and Austria was impending Napoleon appears to have been duped by Bismarck, and to have expected to gain Rhenish territory without taking up arms. Meanwhile the splendor of the court, the continuous improvements in Paris, the rapid growth of wealth throughout France, the subservience of officials, deputies, and journalists, had veiled the decline of administrative energy and the progress of corruption and mismanagement. At length, after the establishment of a great North-German power in 1866, the prestige of the emperor unmistakably sank. He had to loosen the

reins of government at home; and yet the grant of any degree of liberty appeared to jeopardize his own existence. Failing in health, in confidence, in reputation, he was hurried into the war of 1870 by the clerical party at court, and by advisers who saw no help for his dynasty but in a successful war. He was present with his only child (Napoleon Eugénie Louis, born March 16, 1856, killed in Zululand, June 1, 1879), at the bombardment of Saarbrücken on August 2d, and then retired into Metz, which he left on the 15th, the day between the battles of Gourcelles and Mars-la-Tour. The empress insisted on the relieving movement which was then undertaken by MacMahon, and the emperor, going with the army, was made prisoner with 90,000 men at Sedan on September 2d. He was sent to the castle of Wilhelmshöhe, near Cassel, from which he subsequently retired to England. He lived with the empress at Chislehurst; and died there on January 9, 1873.

NAPOLÉON, a round game of cards. Any number may play; about four or five makes the best game. When six play the dealer deals himself no hand, but pays or receives the same as the other players. A pack of fifty-two cards is required. The players cut for deal; the lowest deals. The cards rank as at whist; and the deal goes afterward in rotation to the left, as at whist. The cards are shuffled, and cut to the dealer, who deals each player five cards by one at a time, as at whist. The deal being completed, the player to the dealer's left looks at his hand, and declares how many tricks he will play for (called "standing"). Some players make it compulsory for the eldest hand to declare one trick at least; but if this rule is not in force the eldest hand may decline to play, when he says "I pass." If the eldest hand passes, the next player to the left has a similar option of standing or passing, and so on all round. As soon as anyone stands, the next player after him must either pass or stand for more tricks than the one before him, and so on all round. If all pass, the hand is not played, and the player to the dealer's left deals. Some players compel the dealer to play for at least one trick. The stand-hand plays against all the others. He has the first lead, and the first card he leads makes the trump suit. Each player plays one card at a time in rotation, as at whist, except that the played cards remain face upward on the table in front of the persons playing them. The cards played, one by each player, constitute a "trick." The players must follow suit if able. If unable to follow suit a player may play any card he pleases. No one is obliged to head the trick or to trump. If the stand-hand succeeds in making at least the number of tricks he stood for he wins; if not he loses. If he wins he receives from each of the other players the amount previously agreed on for each trick stood for; if he loses he similarly pays all the others. If any one declares "Nap," *i.e.*, that he will play for all five tricks, no subsequent player can stand. The hand is played as before. If the player declaring Nap wins he receives double stakes all round; if he loses he only pays single stakes all round.

NARA, the oldest of the successive capitals of Japan, is situated in the north of Sakai *ken* (province of Yamato), about sixty-five miles east of Ozaka, on the slope of a range of picturesque hills, beautifully wooded with cryptomerias, evergreen oaks, the rare *Podocarpus Nageia*, etc. From 710, when it was chosen as her residence by Gemmei Tenno, till 794, when Kioto was founded by Kuwammu Tenno, Nara was the chief seat of the mikados. At present (though hardly a tenth of its former size) it has a population of about 21,500.

NARBADA. See **NERBUDDA**.

NARBONNE, a city of France, chief town of an arrondissement in the department of Aude, lies five

miles from the Mediterranean. The cathedral (St. Just) is the third on the site, and dates from the close of the thirteenth century, when the choir (130 feet high) was built. Two towers were added in the fifteenth century. The population is 28,134.

NARBOROUGH, SIR JOHN, naval commander, was descended from an old Norfolk family. He received his commission in 1664, and in 1666 was promoted lieutenant for gallantry in the action with the Dutch fleet off the Downs in June of that year. After the peace he was chosen to conduct a voyage of exploration in the South Seas. He set sail from Deptford on November 26, 1669, and entered the Straits of Magellan in October of the following year, but returned home in June, 1671, without accomplishing his original purpose. In 1675 he was sent to suppress the Tripoline pirates, and by the bold expedient of dispatching gunboats into the harbor of Tripoli at midnight and burning the ships he induced the dey to agree to a treaty. Shortly after his return he undertook a similar expedition against the Algerines. In 1680 he was appointed commissioner of the navy, an office he held till his death in 1688.

NARCISSUS, a genus of bulbous plants belonging to the family *Amaryllidaceæ*. There are twenty or thirty wild forms, natives of central Europe and the Mediterranean region, while one extends through Asia to Japan. From these, or rather from some of these, by cultivation and hybridization, have arisen the very numerous forms which adorn our gardens in spring.

NARCOTICS are substances having the physiological action, in a healthy animal, of producing lethargy or stupor, which may pass into a state of profound coma or unconsciousness along with complete paralysis, terminating in death. Certain substances of this class are used in medicine for the relief of pain, and are then called anodynes, while another group produces profound sleep, and are consequently known as hypnotics. In one sense, anæsthetics, such as chloroform and ether, may be held to be narcotics, but, as they are usually volatile substances causing unconsciousness for a comparatively short time, they are conveniently separated from the true narcotics, the effects of which are much more lasting. These distinctions are to a great extent artificial, as it is evident that a substance capable of producing partial insensibility to pain, or sleep, will inevitably in larger doses cause profound coma ending in death. Hence we find the same substances sometimes classed as anodynes and at other times as hypnotics. For example, small doses of opium, or of one or other of its preparations, relieve pain, while larger doses act as hypnotics, causing deep sleep passing into coma. As examples of anodynes, we have opium and some of the alkaloids in it, *Cannabis indica* or Indian hemp, belladonna and its alkaloid atropia, hyoscyamus or henbane and its alkaloid hyocyamia, and the anæsthetics properly so called, such as chloroform, ether, ethidene, etc. The hypnotics are such substances as opium and its alkaloids, chloral hydrate, hyoscyamus, lactucarium (obtained from *Lactuca virosa*, the strong-scented lettuce), and preparations of *Humulus Lupulus* (the common hop), such as inhalations of the steam of infusions, or hop-pillows. In addition we may group as narcotics certain substances which cause not only narcotism, but also the specific effect of dilatation of the pupil of the eye, and disorder of the mechanism of focusing the eye for various distances resulting in dimness and confusion of vision. Such are sometimes called mydriatics; they embrace belladonna, henbane, stramonium, cryptopia (one of the alkaloids in opium), and Indian hemp.

All of these substances act on the nervous system,

and, although the physiological action of each is characteristic, there are many symptoms common to the whole group; indeed the course of action of all shows three well-defined stages:—(1) there is first a period of apparent exaltation of function; (2) this is followed by a period of diminution and perversion of functional activity; (3) there is a time of loss of function, in which there is profound coma and paralysis. This is well illustrated by a description of the symptoms caused by opium. A small dose not infrequently acts as a stimulant; there is a sense of vigor, a capability of severe exertion, and an endurance of labor without fatigue. A larger dose often exerts a calming influence, with a dreamy state in which images and ideas pass rapidly before the mind without fatigue. This is succeeded by sleep which, according to the strength of the dose and the idiosyncrasy of the person, may be light and dreamy, or like natural profound sleep, or deep and heavy, passing into stupor or coma. From this a person may awaken with a feeling of depression, languor, or wretchedness, often associated with sickness, headache, and vomiting. If a person do not thus awaken, and the dose be large, there is the condition of deep coma. This condition is succeeded by one of even deeper prostration. The person cannot be aroused; the pupils may now become somewhat dilated, especially on the approach of death; the countenance has a deathlike aspect, and a bluish-white tint; the pulse quickens and becomes smaller, and more and more feeble; and the skin is covered with a cold, clammy sweat. The vital functions are reduced to the lowest ebb, and death then occurs from failure of respiration. Such a train of symptoms is called narcotism. These general symptoms are of course largely modified by the amount of the dose. If it be very large, the person may pass very quickly into the deeply comatose stage.

NARD. See SPIKENARD.

NARSES, an officer in the household of Justinian, who was charged with the reconquest and government of Italy, is one of the most important historical figures of the sixth century. He was a eunuch, but we are nowhere distinctly informed that he was of servile origin. A native of Persarmenia (that is to say, of that portion of Armenia which was allotted to Persia by the partition of 384), he may have been prepared and educated by his parents for service in an Oriental court. If the statement that he died at the age of ninety-five be correct, he was born about the year 478.

NARSINHPUR, a district in the chief-commissionership of the Central Provinces, India, forms a portion of the upper part of the Nerbudda valley. The population in 1880 was 365,173.

NARVAEZ, PÁMFILO DE, Spanish adventurer, was an hidalgo of Castile, born at Valladolid about 1480. He was one of the subordinates of Velazquez in the reduction of Cuba, and, after having held various posts under his governorship, was put at the head of the force sent to the Aztec coast to compel Cortes to renounce his command; he was surprised and defeated, however, by his abler and more active compatriot at Cempoalla, and made prisoner with the loss of an eye (1520). After his return to Spain he obtained from Charles V. a grant of Florida as far as the River of Palms, and landed at Tampa Bay in 1528. Having built rude boats, he sailed hence for Mexico on September 22d, but the vessel which carried Narvaez was driven to sea in a storm and perished. His lieutenant, Cabeza de Vaca, with three others who ultimately reached land, made his way across Texas to the Gulf of California.

NARVAEZ, RAMON MARIA, Spanish soldier and statesman, was born at Loja, Granada, on August 4, 1800, entered the army at an early age, and saw active

service under Mina in Catalonia, in 1822. In 1823 the French invasion caused him to retire into private life, whence he reëmerged in 1832, speedily attaining the rank of colonel. He achieved great popularity by his victory over Gomez, the Carlist general, near Arcos, in November, 1836, and after clearing La Mancha of brigands by a vigorous policy of suppression in 1838 he was appointed captain-general of Old Castile, and commander-in-chief of the army of reserve. In 1840, for the part he had taken at Seville in the insurrection against Espartero, he was compelled to take refuge in France, where, in conjunction with Maria Christina, he planned the expedition of 1843 which led to the overthrow of his adversary. In 1844 he became prime minister, and was created field-marshal and duke of Valencia, but his policy was too reactionary to be tolerated long, and he was compelled to quit office in February, 1846. He now held the post of ambassador at Paris, until again called to preside over the council of ministers in 1847; but misunderstandings with Maria Christina led to his resignation in the following year. His ministry succeeded that of O'Donnell for a short time in 1856-57, and he again returned to power for a few months in 1864-65. He once more replaced O'Donnell in July, 1866, and was still in office when he died at Madrid on April 23, 1868.

NARWHAL, an animal of the order *Cetacea*, belonging to the genus *Monodon*, of which there is but one species known, *M. monoceros* of Linnæus. It is included in the family *Delphinidae* or Dolphins, and closely resembles the *Beluga* or White Whale in all points of its structure except its dentition, which presents most anomalous characteristics. In a narwhal twelve feet long, from snout to end of tail, the exerted portion of the tusk may measure six or seven and occasionally eight feet in length. It projects horizontally forward from the head in the form of a cylindrical or slightly tapering, pointed tusk, composed of ivory, with a central cavity reaching almost to the apex, without enamel, and with the surface marked by spiral grooves and ridges, running in a sinistral direction. Occasionally both left and right tusks are developed, in which case the direction of the grooves is not reversed, but the same in both. No instance has ever been met with of the complete development of the right tusk associated with a rudimentary condition of the left. In very young animals several small additional teeth, irregular in number and position, are present, but these usually disappear soon after birth.

The narwhal is essentially an Arctic animal, frequenting the icy circumpolar seas, and but rarely seen south of 65° N. latitude. Like most other cetaceans it is gregarious in its habits, being usually met with in "schools" or herds of fifteen or twenty individuals. Its food appears to be various species of cephalopods, small fishes, and crustaceans. The purpose served in the animal's economy by the wonderfully developed asymmetrical tusk—or "horn," as it is commonly but erroneously called—is not known.

NASH, RICHARD, better known as "Beau Nash," was born at Swansea, October 18, 1674. Nash found it necessary to turn gamester. The pursuit of his calling led him, in 1704, to Bath, where he had the good fortune almost immediately to succeed Captain Webster as master of the ceremonies. His qualifications for such a position were unique, and under his conventional authority reforms were introduced which rapidly secured to Bath a leading position as a fashionable watering-place. He died in 1761.

NASH, THOMAS, poet, playwright, and pamphleteer, was one of the most notable literary celebrities in the brilliant last decade of the reign of Elizabeth. The exact years of his birth and death have not been ascer-

tained; but from the fact that he proceeded B.A. (St. John's, Cambridge) in 1585 it has been conjectured that he was born about 1564, and his death was lamented in an epigram by Fitzgeoffrey in 1601. He tells us himself that his birthplace was Lowestoft.

NASHUA, a city of Hillsborough county, N. H., on hilly ground at the confluence of the Merrimac and the Nashua, forty miles north-northwest of Boston. In 1803 the site was "a sandy plain covered with pine trees;" but after the formation of the Nashua Manufacturing Company in 1823 the village rapidly grew up, and in 1853 it was incorporated as a city. Its population increased from 10,543 in 1870 to 19,311 in 1890. The water-power of the Nashua river being rendered easily available by means of a canal three miles long and eight feet deep, constructed in 1825-26, a great variety of industrial establishments are situated in the city. Besides the sheetings, shirtings, prints, and flannels manufactured by the original Nashua company and its younger rivals, iron goods, locks, edge tools, bedsteads, carpets, shuttles, bobbins, shoes, cards, glazed paper, are all produced on a large scale.

NASHVILLE, the capital of Tennessee, and seat of justice of Davidson county, stands on the Cumberland river (spanned there by a suspension bridge and a truss railway bridge with a "draw" 200 feet long), 200 miles above its junction with the Ohio. Occupying a site of considerable irregularity, and dominated by the hill (558 feet above the sea) on which the capitol is built, Nashville on the whole presents a picturesque and attractive appearance. The capitol is an imposing stone edifice, erected in 1845 at a cost of nearly \$1,000,000, and surmounted by a central tower 206 feet in height. Other public buildings deserving mention are the courthouse (1857), the market-house and city hall (1855), the State penitentiary (1830), the State blind asylum (1850), the four universities, and two large female seminaries. Nashville University, incorporated as Davidson College in 1785, as Cumberland College in 1806, and under its present name in 1825, now embraces three distinct schools—Montgomery Bell Academy, Nashville Medical College, one of the largest in the Southern States, and the Normal College, established and endowed by the trustees of the Peabody Fund. Vanderbilt University was founded in 1872 by six conferences of the Methodist Episcopal Church, South, and in 1873 was named after Cornelius Vanderbilt of New York, who gave it \$1,000,000. His son has given it about \$250,000 additional. It has a fine group of buildings and seventy-five acres of land west of the city. In 1882 it had fifty-one instructors and 603 students. Fisk University, established in 1866 for the education of men of color, and widely known through the Jubilee Singers, had eighteen teachers and 424 students in 1882. The Tennessee Central (Methodist) College, likewise dating from 1866, is intended for colored students, as is also the Roger Williams University (Baptist). The State library in the capitol had 27,000 volumes in 1882; and the Watkins Institute library occupies a building erected in 1882, at a cost of \$130,000. Being the natural center of a wide productive region, and well served by river and rail, Nashville has an extensive and rapidly growing trade, especially in cotton and tobacco. Its manufacturing establishments comprise three large cotton factories (34,000 spindles, 700 hands), sawmills, gristmills, planing factories, carriage factories, extensive furniture factories, distilleries, paper-mills, cotton-seed-oil mills, and stove foundries. The population was 5,566 in 1830, 10,165 in 1850, 16,988 in 1860, 25,865 in 1870, and 76,168 in 1890.

The total receipts of the city treasury for the fiscal year ending October 1, 1889, were \$1,219,068, and the disbursements \$1,077,571. The bonded debt of the city

amounted to \$2,605,400. The total assets (public property) were \$3,206,309, and the liabilities \$2,727,871. The valuation of taxable property in 1889 was \$30,233,245, and the rate of tax fifteen mills on the dollar.

The enumeration of children of school age (six to twenty-one) was 17,895 in 1888, with an average attendance of 6,405 pupils in the public schools. There were 152 teachers employed, and the total expenditures were \$108,034. The total value of school property is \$294,000.

Settled in 1780, Nashville received incorporation as a town in 1784 and as a city in 1806. It was not till 1843 that it became the capital of the State, though, with the exception of the period from 1815 to 1826, the legislature had met there from 1812. In February, 1862, Nashville was evacuated by the Confederate General A. S. Johnston, and was held from that time by the Federal forces. The attempt made in December, 1864, by the Confederate General Hood to recover the now strongly-fortified town resulted in the "battle of Nashville," in which his army was completely routed by that of Gen. G. H. Thomas.

NÁSIK, or NASSICK, a district in the Bombay presidency, India. The population in 1881 was 781,206.

NÁSICK, the chief town of the district (population 22,436), is situated on the Godávári, and is considered a place of great sanctity by Hindus, who make pilgrimages to its temples from all parts of India.

NASIR KHOSRAU. Abú Mu'ín-ed-din Násir b. Khosrau, the first great didactic poet of Persia, was a descendant of the imám 'Alí Ridá, and was born, according to his own statement in one of his kasídas, 394 A.H. (1004 A.D.), at Kubádiyán, near Balkh, in Khorásán. The first forty-two years of his life are obscure; we learn from incidental remarks of his that he was a Sunnite, well versed in all the branches of natural science, in medicine, mathematics, astronomy, and astrology, in Greek philosophy, and the interpretation of the Koran; that he had a comprehensive knowledge of many other philosophic systems and religious creeds professed in the East; and that he was, withal, much addicted to worldly pleasures, especially to excessive wine drinking, the renunciation of which forms a prominent topic in his later odes. He had studied Arabic, Turkish, Greek, the vernacular languages of India and Sind, and perhaps even Hebrew; he had visited Multán and Lahore, and been—probably in an official capacity—an eyewitness of the splendid Ghaznavide court under Sultán Mahmúd, Firdousí's patron, and his son Mas'úd. Later on he had chosen Merv for his residence, and was the owner of a house and garden there. When he first steps into the full light of history, in 437 A.H. (1045 A.D.), we see him in the position of a financial secretary and revenue collector of the Seljúk sultan Toghrulbeg, or rather of his brother Jághirbeg, the emír of Khorásán, who had conquered Merv in 1037.

The Dábistán fixes his flight from Korásán in 456 A.H. (1064 A.D.), but there is strong evidence in some of his kasídas that this event took place some four or five years before that date; and as his death occurred in 481 A.H. (1088 A.D.) he must have lived in his exile from twenty-five to thirty years. His "nom de plume" was "Hujjat."

NASMYTH, ALEXANDER, portrait and landscape painter, was born in Edinburgh on September 9, 1758. He studied at the 'Trustees' Academy under Runciman, and, at the age of sixteen, attracted the attention of Allan Ramsay, who took the youth with him to London, and employed him upon the subordinate portions of his works. Nasmyth returned to Edinburgh in 1778, and was soon largely patronized as a portrait painter. On his return he painted the excellent portrait of Burns,

now in the Scottish National Gallery, well known through Walker's engraving. In his later years he devoted himself mainly to landscape work, and did not disdain on occasion to set his hand to scene-painting for the theaters. He has been styled, not unjustly, the "father of Scottish landscape art." Nasmyth died in his native city, April 10, 1840. His youngest son, James, was the well-known inventor of the steam-hammer.

NASMYTH, PATRICK, the eldest son of Alexander Nasmyth, was born at Edinburgh on January 7, 1787. Having studied under his father, he went to London at the age of twenty, and soon attracted attention as a clever landscapist. He was a diligent student of the works of Claude and Richard Wilson, and of Ruysdael and Hobbema, upon whom his own practice was mainly founded. His most characteristic paintings are of English domestic scenery, full of quiet tone and color, and detailed and minute expression of foliage, and with considerable brilliancy of sky effect. They were executed with his left hand, his right having in early life been injured by an accident. He died at Lambeth, August 17, 1831.

NASSAU, now forming the bulk of the government district of Wiesbaden, in the Prussian province of Hesse-Nassau, was till 1866 an independent and sovereign duchy of Germany, consisting of a compact mass of territory, 1,830 square miles in area, bounded on the south and west by the Main and Rhine, on the north by Westphalia, and on the east by Hesse. This territory is divided into two nearly equal parts by the river Lahn, which flows from east to west into the Rhine. The southern half is almost entirely occupied by the Taunus Mountains, which attain a height of 2,900 feet in the Great Feldberg, while to the north of the Lahn is the barren Westerwald, culminating in the Salzburgerkopf (2,000 feet). The valleys and low-lying districts, especially the Rheingau, are very fertile, producing abundance of grain, flax, hemp, and fruit; but by far the most valuable product of the soil is its wine, which includes several of the choicest Rhenish varieties, (Johannisberger, Marcobrunner, Assmannshauser, etc.) Nassau is one of the most thickly wooded regions in Germany, about 42 per cent. of its surface being occupied by forests, which yield good timber and harbor large quantities of game. The rivers abound in fish—the salmon fisheries on the Rhine being especially important. There are upward of 100 mineral springs in the district, most of which formerly belonged to the duke, and afforded him part of his revenue. The best-known are those of Wiesbaden, Ems, Soden, Schwalbach, Schlangenbad, Geilnau, and Fachingen. The other mineral wealth of Nassau includes iron, lead, copper, building-stone, coals, slate, a little silver, and a bed of malachite. There are few places of importance besides the above-named spas; Höchst is the only manufacturing town. Wiesbaden, with 50,238 inhabitants, is the capital of the government district as it was of the duchy. The duchy contains 468,311 inhabitants, of whom 242,000 are Protestants, 215,000 Roman Catholics, and 7,000 Jews. The ecclesiastical jurisdiction is in the hands of the Protestant bishop of Wiesbaden and the Roman Catholic bishop of Limburg. Education is amply provided for in numerous higher and lower schools. The annual revenue of the dukedom is about 4,000,000 guildens (\$2,000,000). It furnishes a contingent of 6,000 men to the army of the German Confederation.

NASSAU, the capital of New Providence, and seat of government of the Bahama Islands. At one time the town was noted as a great rendezvous for pirates. Its harbor, admitting vessels drawing twelve feet, acquired much importance during the blockade of the southern ports in the American War. The popu-

lation of Nassau, principally colored people, is about 8,000, out of the total island population of 11,653.

NASTURTIIUM. The common water-cress (*N. officinale*), so largely used as a salad, may be taken as a representative of this genus *Cruciferae*—a genus characterized, for the most part, by pinnately divided foliage, white or yellow cruciform flowers, and long pods with a double row of seeds. The embryo root is folded up along the edge of the cotyledons accumbent. Its flavor is due to an essential oil containing sulphur, its antiscorbutic properties to the presence of iodine, iron, and phosphates.

NATAL, a British colony on the southeast coast of Africa, is bounded on the northeast by Zululand and the Transvaal, on the southeast by the Indian Ocean, on the northwest by the Orange Free State and the Transvaal, and on the southwest by Basutoland, Griqualand East, and the country of the Pondas. It is of an irregular diamond shape, with a length of about 270 miles from north to south, and a breadth of 170 miles from east to west. The extent of seacoast is about 150 miles, and its area is about 17,000 square miles, or 11,000,000 acres (one-third of the size of England). Rich in verdure, and in the wet season clothed with bright green grass and clumps of trees and bushes, and diversified by numerous streams, the landscape indicates a country of great fertility of soil. From the coast to the western boundary of the colony the land rises by terraces or plateaus to an elevation of at least 4,000 feet above the sea-level. For about fifteen miles inland it is broken and hilly, and thickly covered with long grass, and in some parts studded with jungly bush and clumps of palm, euphorbia, and mimosa. For some thirty miles further inland the more elevated but less broken land loses all tropical character, and presents large tracts of good pasturage, but with scarcely any bush or wood. Beyond this district, at an ever-increasing elevation, the country, still hilly and undulating, opens out in many places into more extensive grass plains.

The colony is well watered throughout, but none of the streams are navigable, and all have bars at their entrances. The harbor or port of Natal at Durban (strictly D'Urban), the only natural one in the colony, consists of an outer bay or roadstead, which has a fair anchorage, and an inner bay; at the entrance of the latter is a deepwater channel, where ships of large tonnage can be safely moored, but a sand bar at its entrance restricts the passage of large ships to the highest tides, and in rough weather renders communication with the outer bay quite impracticable.

The summer or hot rainy season lasts from October to March inclusive, and the six remaining months form the winter or cold dry season. In the summer months cloudy afternoons with thunder-storms are frequent, and the accompanying rains are very cool and refreshing. Within thirty miles of the coast fires in dwellings are seldom required throughout the coldest months of the year. The rainfall averages 33.50 inches; it is heaviest in the summer months, but in June and July it frequently happens that there is no rain at all over a large portion of the colony.

Coal of several qualities exists in the Klip River county, with seams varying from four to ten feet in thickness; analysis and experiment have shown it to be very suitable for locomotive and general steam purposes. Some descriptions of it are well suited for gas, and nearly all of it will make good household coal. The area of the available coal-field is some 1,350 square miles, and at a moderate computation the mines contain 2,000,000,000 tons of serviceable coal. In association with these seams of coal very valuable iron ore has been discovered.

The chief forms of plants peculiar to Natal are the liane and mimosa along the coast, and the orchid, aloe, pothos, liliaceous, and fern forms in the upland districts. The heaths and proteads common at the Cape of Good Hope are seldom if ever found in Natal, but almost any varieties of the flora of semi-tropical and temperate countries that are introduced attain perfection. The indigenous timber-trees, mostly found in isolated clumps and in somewhat inaccessible situations, are principally the yellow wood (*Podocarpus elongatus*), sneezewood (*Pteroxylon utile*), stinkwood (*Oreodaphne bullata*), black ironwood (*Olea laurifolia*), white ironwood (*Vepris lanceolata*), and the mangrove (*Rhizophora*); all are very useful woods, and the yellow wood, sneezewood, stinkwood, and ironwood when polished have grain and color equal to maple, walnut, and ebony.

The herds of elephants which roamed in the coast bushes in 1837 have disappeared, and the roar of the lion is no longer to be heard in the uplands. The hippopotamus is very scarce, and nearly all, if not all, the buffalo and quagga have crossed over into Zululand. Leopards or tigers and tiger cats (all called by the natives "ingwe"), and hyenas and wild dogs (*Canis pictus*) of different species, are still found in or about bush jungles and forest clumps; elands (*Antelope oreas*) are preserved on some estates, and there are at least ten distinct species of antelope. Ant-eaters (*Orycteropus capensis*), porcupines, rock rabbits, hares, and cane rats are common in different localities. Baboons (*Cynocephalus porcarius*) and monkeys of different kinds frequent the mountains and rocky kloofs and bush and timber lands. The birds of Natal are of many species; some have beautiful plumage, but none of them, with the exception of the canary, are to be considered as songsters. The crocodile is to be found at the mouths of all rivers, and for a certain distance inland from the sea. Of snakes there are about forty distinct species or varieties. The most dreaded by the natives are called "imamba," of which there are at least eight different kinds; these snakes elevate and throw themselves forward, and have been known to pursue a horseman. Fish of excellent quality and in great quantities abound on the coast. Prawns, crayfish, and oysters are also obtainable, and turtle are frequently captured.

The chief crop is maize, known in South Africa as "meallies," its grain constituting the principal food of about seven-eighths of the population. Maize, indeed, and Kaffre corn, with pumpkins and sweet potatoes, "imhee" or "imfi" (*Sorghum saccharatum*), and tobacco are about the only crops raised by the natives. The European farmers in the uplands, by irrigating the land in the winter months, produce wheat of very fair quality, but not in sufficient quantity to supply the demands of the colony. Oats, barley, and other grains grow readily; and nearly all European vegetables yield fair crops in suitable localities.

The staple productions of Natal have increased with the introduction of the sugar-cane, and sugar and rum are the principal articles of native produce exported. Wool, arrowroot, and feathers are also the outcome of local industry, but the exports of greatest value and importance are the wool and hides of the Transvaal and the Orange Free State, and feathers, ivory, and skins from the interior, which are shipped at Durban.

Until very recently all goods and produce were conveyed in ox-wagons carrying from three to five tons weight. These had to travel on roads sometimes little better than tracks worn by traffic, and frequently impassable during wet weather, and for some years before the breaking out of the Zulu War (1879) the average cost of carriage was as high as 36 cents per ton per mile. Now, however, three lines of railway have

been opened—one of seventy-eight miles from the port at Durban to Pietermaritzburg, another from Durban twenty miles north to Verulam through the sugar lands in that district, and a third seven miles southward to the sugar estates by the Isipingo river. An additional line, of 118 miles, to cost about \$5,590,000, is in process of construction from Pietermaritzburg to Ladysmith. The telegraph between Natal and the Cape Colony was opened in 1878, and in the following year telegraphic communication by way of Lorenzo Marques was extended to England. Branches of telegraph are also carried direct from Natal into the Transvaal and the Orange Free State.

The colony was annexed as a district to the Cape Colony in August, 1845, but in November of the same year it was made a separate government, to be administered by a lieutenant-governor under the general control of the governor of the Cape Colony. The colony is now administered by a governor, the promotion from lieutenant-governor having been made January 28, 1882; and by law No. 1, 1883, the legislative council consists of thirty members, twenty-three of whom are elective and seven non-elective, two of the latter holding office during the royal pleasure.

The total population is about 380,000, of whom about 30,000 are whites, 20,000 Indian coolies, and 330,000 natives, mostly descendants of early refugees from Zululand.

NATAL, a city of Brazil, the capital of the province of Rio Grande do Norte, is situated on the eastern bank of the river of that name. Though the water on the bar is only fourteen feet at low tide, Natal is the first port of any note to the south of Cape Roque, and trades in cotton, sugar, dyewood, and other local produce. It was founded in 1597. The population is about 11,000.

NATCHEZ, a city and port of entry of the United States, capital of Adams county, Miss., lies on the east bank of the Mississippi, 272 miles above New Orleans. Natchez-under-the-Hill, lying on a low alluvial bank, contains the steamboat landing and a few business houses. The main city, Natchez-on-the-Hill, occupies the summit of a bluff which rises nearly 200 feet above the river, and affords a wide view over the cotton plantations of Louisiana. Among the more conspicuous buildings are the city hall, the court-house, the market-house, the Roman Catholic cathedral, the Jewish synagogue, and a number of handsome churches. There are two large cotton factories and other manufacturing establishments. Cotton dealing is the staple trade. The inhabitants numbered 4,454 in 1850, 6,612 in 1860, 9,057 in 1870, and 10,101 in 1890—the city being in population the second in the State.

NATHANAEL ("he whom God gave," equivalent to Nathanah or the Greek Theodore), a common name in later Old Testament times.

NATICK, a town of the United States, in Middlesex county, Mass., near the left bank of the Charles River, a few miles to the southeast of Cochituate Lake, and about eighteen miles west-southwest of Boston by the railway between that city and Worcester. It is mainly engaged in the manufacture of boots and shoes, but also produces clothing, boxes, and carriages. The population in 1890 was 9,118.

Natick ("our land") was in 1650 granted to John Eliot, the Indian "Apostle," for the occupancy of Indians converted to Christianity; and until 1721 the community was governed by a constitution modeled on that of Exodus xviii. Portions of the records, written in the Indian language, are extant. The site of the first Indian church is now occupied by the Unitarian church. Of the Natick Indians only four or five remain, all of

mixed blood. The incorporation of the town dates from 1781.

NATIONAL DEBT. National debt is so universal an institution that it has been described as the first stage of a nation toward civilization. A nation, so far as its finances are concerned, may be regarded as a corporate body or even as an individual. Like the one or the other it may borrow money at rates of interest, and with securities, general or special, proportionate to its resources, credit, and stability. But, while in this respect there are certain points of analogy between a state and an individual, there are important points of difference so far as the question of debt is concerned. A state, for example, may be regarded as imperishable, and its debt as a permanent institution which it is not bound to liquidate at any definite period, the interest, unless specially stipulated, being thus of the nature of transferable permanent annuities. While an individual who borrows engages to pay interest to the lender personally, and to reimburse the entire debt within a certain date, a state may have an entirely different set of creditors every six months, and may make no stipulation whatever with regard to the principal. A state, moreover, is the sole judge of its own solvency, and is not only at liberty either to repudiate its debts or compound with its creditors, but even when perfectly solvent may materially alter the conditions on which it originally borrowed. These distinctions explain many of the peculiarities of national debts as contrasted with those of individuals—though a nation, like an individual, may by reckless bad faith utterly destroy its credit and exhaust its borrowing powers.

A well-organized state ought to have within itself the means of meeting all its ordinary expenses; where this is not the case, either through insufficiency of resources or maladministration, and where borrowing is resorted to for what may be regarded as current expenses, a state imperils, not only its credit, but, when any crisis occurs, its very existence; in illustration of this we need only refer to the cases of Turkey in Europe and some of the states of Central and South America. Even for meeting emergencies it is not always inevitable that a state should incur debt; its ordinary resources, from taxation or from state property, may so exceed its ordinary expenses as to enable it to accumulate a fund for extraordinary contingencies. This, it would seem, was a method commonly adopted in ancient states. The Athenians, for example, amassed 10,000 talents in the interval between the Persian and the Peloponnesian wars, and the Lacedæmonians are said to have done the same. In the early days of Rome the revenue from certain sources was accumulated as a sacred treasure in the temple of Saturn; and we know that when Pompey left Italy he made the mistake of leaving behind him the public treasury, which fell into the hands of Cæsar. In later times, also, the more prudent emperors were in the habit of amassing a hoard. This system has long prevailed in Prussia, and even at the present day exists to some extent in reconstituted Germany. In our own time, of the five milliard francs of indemnity paid by France as a result of the Franco-German war, 150,000,000 were set apart to reconstitute the traditional war-treasury. The German empire, apart from the individual states which comprise it, had, in 1882, a debt of about \$120,000,000, while its invested funds amounted to \$185,000,000, including a war-treasure of \$30,000,000.

All modern states, it may be said, have been compelled to have recourse to loans, either to meet war expenses, to carry out great public undertakings, or to make up the recurrent deficits of a mismanaged revenue. Resources obtained in this way are what constitute national debt proper. Loans have been divided into

forced and voluntary. Forced loans can, of course, only be raised within the bounds of the borrowing country; and, apart from the injustice which is sure to attend such an impost, it is always economically mischievous. The loans which the kings of England were wont to exact from the Jews were really of the character of forced loans, though the method has never been used in England in modern times so extensively as on the Continent. There the sum sought to be obtained in this way has never been anything like realized. In 1793, for example, a loan of this class was imposed in France, on the basis of income; and of the milliard (francs), which it was sought to raise, only 100,000,000 were realized. In Austria and Spain, also, recourse has been had at various times to forced loans, but invariably with unsatisfactory results. Other methods of a more or less compulsory character have been and are made use of in various states for obtaining money, which, as they involve the payment of interest, may be regarded as of the nature of loans; but the debt incurred by such methods is comparatively insignificant, and some of the methods adopted are peculiarly irritating and mischievous. On the other hand, it has occasionally been attempted to raise voluntary loans by appeals to a nation's patriotism; the method has been confined almost exclusively to France. After the revolutions of 1830 and 1848 appeals were thus made to the patriotism of French capitalists to buy 5 per cents. direct from the government at par, at a time when the French 5 per cents. were selling at 80; but the results were quite insignificant. Even if the amount sought for by a government could be obtained on the voluntary principle, the method itself is vicious, withdrawing as it does from the general working capital of the country a sum of serious dimensions. In short, the only economically sound method of meeting expenses which the ordinary resources of a state cannot meet is by borrowing in the open market on the most advantageous terms obtainable.

There are two principal methods of issuing or effecting a loan. Either the state may appeal directly to capitalists and invite subscriptions, or it may delegate the negotiation to one or more bankers. The former method has been occasionally followed in France and Russia, but in practice it has been found to be attended with so many disadvantages to the borrowing state or city that the best financial authorities consider it unsound. The great banking-houses have such a command over the money-market that it is difficult to keep even a direct loan out of their hands. The majority of loans, therefore, are negotiated by one or more of these houses, and the name of Rothschild is familiar to everyone in connection with such transactions. By this method a borrowing state can assure itself of having the proceeds of the loan with the least possible delay and with the minimum of trouble. A loan may be issued at, above, or below par, though generally it is either at or below par—"par" being the normal or theoretical price of a single share in the loan, the sum which the borrowing government undertakes to pay back for each share on reimbursement, without discount or premium. Very generally, as an inducement to investors, a loan is offered at a greater or less discount, according to the credit of the borrowing government.

If a state, for example, borrows at par at 6 per cent. when its credit is low, it may easily when again in a flourishing condition reduce the interest on its debt to 4 or even 3 per cent. The United States Government has actually done so with the debt it had to contract at the time of the civil war. This method of reducing the burden of a debt is evidently no injustice to the creditors of a government, when used in a legitimate way. A

state is at liberty at any time to pay off its debts, and, if it can borrow at 3 per cent. to pay off a 6 per cent. debt, it may with perfect justice offer its creditors the option of payment of the principal or of holding it at a reduced interest. Government debts are, however, sometimes reduced after a fashion by no means so legitimate as this; we need only refer to Turkey, where both principal and interest have been enormously reduced on a debt on which little or no interest was ever paid. Other states have been even more unprincipled, and have got rid of their debts at one sweep by the simple method of repudiation.

The debt of the United Kingdom at the Revolution in 1688 amounted to only \$3,300,000, with an annual charge of \$195,000. During the reign of William III. this increased to the comparatively large sum of \$63,500,000, with an annual charge of \$6,050,000, which at the accession of George I. had grown to \$180,000,000 and \$15,300,000 respectively. In 1727 the capital had increased to \$269,500,000, while by reduction of interest the annual charge had diminished to \$11,800,000. Partly by the operation of the sinking fund, the debt in 1739 had decreased by upwards of \$35,000,000, but the wars which followed left it at the treaty of Aix-la-Chapelle in 1748 at the sum of \$387,000,000. By the end of the Seven Years' War, however, in 1763, the debt had risen to \$666,000,000, besides terminable annuities, and the annual charge to \$25,000,000. At the commencement of the American War, 1775, the debt had fallen to \$630,000,000, but as a result of that war this was more than doubled, and the burden had grown to \$1,350,000,000, including the capitalized value of terminable annuities. After a diminution of about \$50,000,000 during the nine years' peace, the long French wars, which terminated in 1815, left the country burdened with a debt of over \$4,500,000,000, at an annual charge of \$160,000,000. With various fluctuations during the next forty years, the debt gradually diminished to about \$4,000,000,000. The two years of war with Russia cost upward of \$150,000,000, and in 1857 the capital sum had risen to \$4,100,000,000 and the annual charge to \$140,000,000. In 1870 it had fallen again to \$4,000,000,000, which in 1883 had diminished to \$3,750,000,000, with an annual charge of \$145,000,000, including terminable annuities and the charge thereon, as well as the sinking fund. The actual capital of the British debt does not represent by any means the sums really received by the state. During the past and the early years of the present century enormous sums were borrowed at a price far below par, the difference adding many millions to the actual burden of the debt. On April 5, 1889, the English national debt was \$3,450,000,000, and the annual charge was \$130,000,000.

One peculiarity of the national debt of France is that it is reckoned, not according to capital, but according to rente or interest; so that any estimates based on rente must be regarded as approximate. Another peculiarity is the minute distribution of the consolidated debt among a multitude of creditors, most of whom are French; this arises from the fact that the shares in French debt may be subdivided into minute parts, and an investor may thus purchase a few francs' worth of rente. Thus in 1883 the number of holders of rente was over 4,000,000. The debt of France can be traced as far back as 1375, and at the death of Louis XIV. in 1715 it is estimated to have amounted to a capital of \$600,000,000, though this was arbitrarily reduced in the following year to \$400,000,000. The republican government of 1793 canceled nearly the whole of the then existing debt, reducing it to a capital of \$160,000,000, with a rente of £8,000,000. During the empire, notwithstanding Napoleon's extensive wars, the debt had only grown to 350,000,000, including a floating

debt of \$100,000,000. Under the Bourbons, what with war-levies and constant deficits, it grew rapidly, and in 1830 stood at \$700,000,000. To this the Orleans dynasty added \$200,000,000, leaving the debt in 1848 at \$900,000,000. During the four years of the republic this grew to \$1,200,000,000, while the enormous deficits and the wars of the second empire raised it to \$2,700,000,000 in December, 1870. The further cost of the German war, with its enormous indemnity and the foreign occupation of 1870-73, added upward of \$1,500,000,000 to this. Since then the French debt has steadily grown, and in 1889 stood (capitalizing all classes of debt) at about \$6,200,000,000, with an annual charge of \$250,000,000—the largest in the world.

In 1763, at the end of the Seven Years' War, Austria had a debt of only \$73,000,000; but, as it is a country of almost constant deficits, this sum has rapidly increased. In 1815 it was \$400,000,000; in 1830, \$525,000,000; in 1848, \$600,000,000; in 1862, after the French war, \$1,300,000,000, to which the war with Prussia added \$200,000,000 in 1866. Since then it has grown apace, and in 1889 stood at \$2,000,000,000, including floating debt, paper-money, and Austria's special liabilities, but excluding the special debt of Hungary, which amounted to over \$600,000,000; Hungary, besides, contributes three-tenths to the interest of the common debt, this interest amounting to \$60,000,000, in addition to over \$10,000,000 for Austria's special debt.

The debt of Prussia in 1800 was only \$26,000,000, which as a result of the French wars grew by 1820 to \$150,000,000. By 1842 \$50,000,000 were paid off, but in 1866 it had risen to \$210,000,000, partly from deficits, partly from war preparations, and partly from money sunk in the construction of railways. The war with Austria, and the annexations in 1866, raised it by 1870 to \$280,000,000. Since then it has nearly doubled, and in 1889 had reached the sum of \$1,000,000,000. Much of the debt of Prussia has, however, been contracted for railways and the development of the resources of the country, and is in fact nearly covered by the revenue of the state railways, domains, and mines. The German empire, as such, had no debt at the time of its reestablishment in 1870, though one has since been created. Besides Prussia, each of the German states has its own special debt. In all these amounted to about \$850,000,000, most of this sum having been borrowed for the construction of railways, so that the actual burden is comparatively small. Thus the total debt of the empire and of the states composing it is over \$2,000,000,000.

It is difficult to obtain any trustworthy figures as to the debt of Russia. The history of its finances is a history of almost continual deficits, largely covered since the time of Catherine II. by the issue of paper rubles, which at her death amounted to about \$150,000,000, and in 1817 to \$620,000,000. The total debt was first stated for 1853, when it was given as \$620,000,000, including paper money. In 1858, after the Crimean War, it was \$1,200,000,000, and in 1869, including the floating debt, \$1,800,000,000. In 1889 it was estimated at \$3,700,000,000, one-third of which was paper rubles. Were the depreciated ruble taken at par, the sum would be nearly half as much again. The interest on the debt in 1889 amounted to \$210,000,000.

In 1876 the debt of Turkey stood at \$1,450,000,000, but since then, by a process of reduction, it has been brought down to \$900,000,000, besides an internal debt estimated at \$100,000,000.

The united kingdom of Italy began in 1860 with a debt of \$480,000,000, which, mainly through continual deficits, but partly by the construction of railways, had grown to \$4,300,000,000 in 1889.

Like Austria, Spain has been a country of constant deficits, combined with frequent repudiations and chronic inability to meet the claims of creditors. Spain was deeply in debt so long ago as the sixteenth century; the amount in 1745 was \$45,000,000, which was repudiated by Ferdinand VI. A commission in 1822 reported the debt at \$700,000,000, but in 1822 a second junta reduced it to \$250,000,000. In 1851, with the floating debt, the amount was \$550,000,000, one half of which was declared passive, bearing no interest. In twenty years this had more than doubled, being in 1870 \$1,150,000,000, with an annual charge of \$33,000,000. In 1887 the capital sum had increased to \$2,500,000,000, but by a process of conversion this was reduced to \$1,300,000,000.

Portugal has for its size a large debt, the result also of a vicious financial administration. It began in 1796 with \$4,500,000, which in 1854 rose to \$100,000,000, in 1866 to \$215,000,000, in 1871 to \$320,000,000, and in 1889 to \$870,000,000.

Greece began her independence by becoming a debtor in 1824 for \$4,000,000, and her borrowings since have loaded the little kingdom with a debt of \$120,000,000, the interest on which has never been regularly and fully paid. Part of the debt is guaranteed by England, France, and Russia.

The debt of Holland began in the sixteenth and seventeenth centuries in her struggle with Spain and wars with England, and in 1778 the Dutch were oppressed with a debt of \$300,000,000, which by 1814 had risen to \$700,000,000, the annual charge per head of population being over \$8. By 1851 the capital was reduced to \$500,000,000, which has gone on steadily decreasing, and in 1889 the capital sum was \$450,000,000.

The debt of Belgium began with \$50,000,000 taken over from Holland after 1830, which, after growing to \$190,000,000, and again falling by the operation of the sinking fund to \$120,000,000 in 1865, has since steadily grown to about \$440,000,000 in 1889, including the railway purchase, the annuities granted for which represent about \$65,000,000. Most of the remainder of the debt is covered by the proceeds of the various public works for which it has been raised.

The debt of Denmark was \$20,000,000 in 1821. Partly through deficits, partly through war with Prussia, and partly owing to the construction of state railways, this grew to \$73,000,000 in 1865. This declined to \$47,000,000 in 1880, but subsequent loans raised it to over \$50,000,000 in 1889.

The existing debt of Sweden began with a railway loan of \$6,000,000 in 1858, and nearly all her subsequent loans have been contracted for similar purposes, the total debt in 1889 being \$75,000,000.

The United States began its career as a federal republic with a debt of \$75,000,000 (1791), on which there was little increase till 1816, when it reached \$125,000,000, which in 1835 was almost extinguished. The debt, however, rose again, but never exceeded \$70,000,000 till 1860, the year before the civil war, when it reached \$90,000,000. During the next four years the debt rose rapidly, and after the conclusion of the war in 1865 the country was saddled with a debt of \$2,700,000,000. This has gone on decreasing since with wonderful rapidity, on account of the systematic application of the large surplus revenue to its reduction, and in November, 1889, the total indebtedness was \$1,060,950,000.

NATIVE AMERICANS. Between the years 1840 and 1845 a party known as the "Native Americans" came into some notoriety in the Eastern States, and in 1844 elected James Harper as mayor of New York city. This success, however, was not so much owing to the anti-alien element in the party as to the personal popularity of the nominee. The party languished for ten years, but

in 1855 another Native American organization rose in the field of politics. The American party was organized as a secret order, and its members when questioned about it invariably replied that they "knew nothing." From this the party became known as the "Know Nothing" party. It had made great headway almost before its existence was more than suspected, and in 1855 elected governors and legislatures in five Northern States and in Kentucky and Florida, and had shown strength in other States. In 1856 a national campaign was inaugurated with Millard Fillmore for the standard-bearer. The platform called for the election to office of none but native-born citizens, specially proscribed Roman Catholics (as acknowledging allegiance to a foreign prince), and demanded that the period of probation for foreign-born denizens seeking naturalization should be extended to twenty-one years. The Know Nothing candidate received the eight electoral votes of Maryland in 1856, but was swallowed up by the rise of the great Republican party.

NATOLIA, or ANATOLIA. See ASIA MINOR.

NATRON. See SODA.

NATURALIZATION. See ALIEN.

NAUDE, GABRIEL, French librarian and scholar, was born at Paris in February, 1600, and died in 1653.

NAUGATUCK, a post village of New Haven county, Conn., fifteen miles from New Haven, is a growing manufacturing place with a population in 1890 of 6,000.

NAUMACHIA, the Greek word denoting a naval battle, was used by the Romans as the name for mimic sea-fights which were shown as a spectacle to the public.

NAUMBURG, the chief town of a circle in the district of Merseburg, Prussian Saxony, and the seat of the provincial law courts, is situated on the Saale, near its junction with the Unstrut, in the center of an amphitheater of vine-clad hills. There are three Protestant churches, a Roman Catholic church, a gymnasium, a realschool, an orphanage, and two or three hospitals. The town-hall was originally the residence of the bishop. The inhabitants, who number 17,868, are chiefly employed in producing wine, but also manufacture cotton and woolen fabrics, chemicals, combs, and leather.

NAUPACTUS. See LEPANTO.

NAUPLIA, a town in the Peloponnesus, at the head of the Argolic Gulf. In the classical period it was a place of no importance, and when Pausanias lived, about 150 A.D., it was deserted. At a very early time, however, it seems to have been of greater note, being the seaport of the plain in which Argos and Mycenæ are situated. A hero Nauplius took part in the Argonautic expedition; another was king of Eubœa. Population, 5,000.

NAUTILUS. A cuttle fish, known as the "Portuguese man-of-war."

NAVAL ACADEMY. The Naval Academy of the United States at Annapolis, Md., was founded in 1845 for the education of officers of the navy, in the same manner as the Academy at West Point educates officers for the army. During the Civil War the Academy was temporarily removed to Newport, R. I., and in 1867 it was again opened at Annapolis. Nominations to the Naval Academy are made upon the recommendation of congressmen, and the president selects ten at large. All candidates must be between fourteen and eighteen years of age, physically sound and of robust constitution, and must pass an examination according to the regulations prescribed by the secretary of the navy. Successful candidates sign articles binding themselves to serve in the United States navy for eight years (including the five years probation in the Naval Academy), and each receives an

allowance of \$500 a year while a naval cadet. A line officer of rank not below that of captain is assigned as superintendent of the Academy, which is governed by a board composed of the superintendent, the commandant of cadets, and the heads of departments. The cadets are divided into four classes, corresponding to the years of instruction, and they are subject to strict rule and discipline. Practical instruction in drill, astronomy, gunnery, navigation and other branches is given, and practice cruises are had each year.

NAVARINO, or NEOCASTRO, a seaport of the Morea, Greece, in the monarchy of Messenia, stands on the south shore of the Bay of Navarino. It consists of a citadel, situated on a high rock, and a lower town—the whole being surrounded by a wall. The population is under 2,000.

The word Navarino is explained as equivalent to Avarino, and is said to record an Avar settlement made here in the sixth century. The name Neocastro distinguishes the place from Palæocastro, the alleged site of the ancient Pylus, on the northern shore of the bay. Sphacteria was the scene of the famous blockade and defeat of the Spartans in 425 B.C.; and it was by the victory of the combined fleets of Great Britain, France, and Russia over those of Turkey and Egypt in the Bay of Navarino on October 27, 1827, that the independence of Greece was virtually secured.

NAVARRA, an inland province of northern Spain, its greatest length from north to south being ninety miles, its breadth from east to west eighty-six miles, and its area 4,046 square miles. The population is 304,184. It is bounded on the north by France (Basses Pyrénées), on the east by Huesca and Zaragoza, on the south by Zaragoza and Logroño, and on the west by Alava and Guipuzcoa. It is traversed from east to west by the Pyrenees and by the Cantabrian mountains, their continuation in the west, which on the northeast especially presents an almost impassable barrier, and incloses numberless secluded pastoral valleys. From Navarra there are only three practicable roads for carriages into France—those by the Puerta de Vera, the Puerta de Maya, and Roncesvalles. The chief river flowing toward the Atlantic is the Bidasoa, which rises near the Puerta de Maya, and after flowing southward through the valley of Baztan takes a northeasterly course; by far the larger portion of the province has its drainage to the Mediterranean through the Ebro, whose main feeders there are the Ega and the Aragon with its tributary the Arga. The hilly districts are almost entirely appropriated to forests and pasture, the most common trees being the pine, beech, oak, and chestnut. Much of the lower part of the province is well adapted for agriculture, producing the various cereals in remunerative abundance; the principal fruit grown is the apple, from which cider is made in some districts; hemp, flax, and oil also occur, and the cultivation of the mulberry for the silk-worm is not unknown. Game, both large and small, is abundant in the mountains, not even the bear being wholly extinct; and the streams abound with trout and other fish. The capital is Pamplona, with a population of 25,630. It is connected by rail on the west with Alsasua on the trunk line between Madrid and San Sebastian, and with the Ebro valley in the south. There are no other railways in the province. Besides Pamplona, the only ayuntamiento with a population exceeding 10,000 is Tudela (10,086); Baztan comes next with 9,931.

NAVARRETE, JUAN FERNANDEZ, surnamed El Mudo (The Mute), an eminent Spanish painter of the Madrid School; was born at Logroño in 1526. He received his first instructions in art from Fray Vicente de Santo Domingo, a Hieronymite monk at Estella, and

afterward he visited Naples, Rome, Florence, and Milan. According to the ordinary account he was for a considerable time the pupil of Titian at Venice. In 1568 Philip II. summoned him to Madrid with the title of king's painter and a salary, and employed him to execute pictures for the Escorial. The most celebrated of the works he there produced are a *Nativity*, a *Baptism of Christ* (now in the Madrid Picture Gallery), and *Abraham Receiving the Three Angels* (one of his last performances, dated 1576). He died at Toledo in February, 1579.

NAVARRETE, MARTIN FERNANDEZ DE, Spanish historian, was born at Abalos, Logroño, in 1765, received his early education at the seminary in Vergara, Guipuzcoa, and entered the navy as a midshipman in 1780. His ship was engaged in the unsuccessful operations against Gibraltar in 1782, and afterward in the suppression of Algerine pirates. Rejoining the navy in 1793, he was present at the siege of Toulon, and afterward received command of a frigate. From 1797 to 1808 he held in succession various important posts in the office of the minister of marine. In 1808 the French invasion led to his withdrawal to Andalusia, and the rest of his life was entirely devoted to literature. At the time of his death, which occurred on October 8, 1844, he was assisting in the preparation of the *Coleccion de Documentos Ineditos para la Historia de España*.

NAVIGATION is the art of conducting a ship across the ocean. It is here treated to the exclusion of seamanship, which forms a distinct subject.

Up to the time of the Portuguese exploring expeditions, sent out by Prince Henry, which led to the discovery of the Azores in 1419, and the rediscovery of the Cape Verd Islands in 1447, and of Sierra Leone in 1460, navigation had been conducted in the most rude, uncertain, and dangerous manner it is possible to conceive. Thousands of years had passed without the least improvement being introduced, except the magnetic needle about the beginning of the fourteenth century (see COMPASS and MAGNETISM). Prince Henry did all in his power to bring together and systematize the knowledge then obtainable upon nautical affairs; he also established an observatory at Sagres (near Cape St. Vincent) in order to obtain more accurate tables of the declination of the sun.

The backward state of navigation at this time is best understood from a sketch of the few rude appliances which the mariner had. He had a compass, a cross-staff or astrolabe, a moderately good table of the sun's declination, a correction for the altitude of the pole star, and occasionally a very incorrect chart. The first map or sea chart seen in England was brought by Bartholomew Columbus in 1489, and the first map of England was made in 1520. Decimal arithmetic was invented by Simon Stevin about the end of the sixteenth century. Watches were unknown till 1530, and immediately Gemma Frison or Frisius seized the idea for the purpose of ascertaining the difference of longitude between two places. They were too rough to be of use, and their advocate proposed to correct them by water-clocks or sand-clocks. Almanacs were first published in Poland in 1470, and in London three years later. These contained tables of the sun's declination and that of many of the stars, and tables for finding the latitude by the pole star and the "pointers." There was not till 1607 any means whatever of measuring a ship's progress through the water, and none in general use till twenty or thirty years later (see LOG).

The "cross-staff" appears to have been used by astronomers at a very early period for measuring heights and distances, more recently by seamen for

measuring altitudes. It was one of the few instruments possessed by Columbus and Vasco da Gama. Another primitive instrument in common use at the beginning of the sixteenth century was the astrolabe, which was more convenient than the cross-staff for taking altitudes, but was incapable of measuring distances.

Thirty-eight years after the discovery of America, when long voyages had become comparatively common, Gemma Frisius wrote upon astronomy and cosmogony, with the use of the globes. His book comprehended much valuable information to mariners of that day. The system adopted is that of Ptolemy. The following are some of the points of interest for the subject before us. There is a good description of the sphere and its circles; the obliquity of the ecliptic is given as $23^{\circ} 30'$. The distance between the meridians is to be measured on the equator, allowing 15° to an hour of time; longitude is to be found by eclipses of the moon and conjunctions, and reckoned from the Fortunate Islands (Azores). Latitude should be measured from the equator, not from the ecliptic. The use of globes is very thoroughly and correctly explained.

In 1537 Pedro Nuñez (Nonius), cosmographer to the king of Portugal, published a work on astronomy, charts, and some points of navigation. He recognized the errors in plane charts, and tried to rectify them. To Nuñez has been erroneously attributed the present mode of reading the exact angle on a sextant, the scale of a barometer, and various other things, the credit of which is due to Vernier nearly a hundred years later. In 1545 Doctor Pedro de Medina published *The Art of Navigation* at Valladolid, dedicated to Don Philip, prince of Spain. This appears to be the first book ever published professedly on navigation. In 1556 Martin Cortes published at Seville *The Art of Navigation*. He gives a good drawing of the cross-staff and astrolabe, also a table of the sun's declination for four years, and a calendar of saints' days. The motions of the heavens are described according to the notions then prevalent, the earth being viewed as fixed. He recommends the height of the pole being found frequently, as the estimated distance run was imperfect. He devised an instrument whereby to tell the hour, the direction of the ship's head, and where the sun would set. A very correct table is given of the distances between the meridians at every degree of latitude, whereby a seaman could easily reduce the difference of longitude to departure. Gerhard Mercator's great improvements in charts have been noticed in the article MAP.

The Dutch published charts made up as atlases as early as 1584, with a treatise on navigation as an introduction.

In 1585 Roderico Zamorano, who was then the lecturer at the naval college at Seville, published a concise and clearly-written compendium of navigation; he follows Cortes in the desire to obtain better charts.

In 1594 Blundeville published a description of Mercator's charts and globes; he confesses to not having known upon what rule the meridians were enlarged by Mercator, unless upon such a table as Wright had sent him.

In 1594 the celebrated navigator John Davis published a pamphlet of eighty pages, in black letter, entitled *The Seaman's Secrets*, in which he proposes to give all that is necessary for seamen—not for scholars on shore. He defines three kinds of sailing: horizontal, paradoxical, and great circle. His horizontal sailing consists of short voyages which may be delineated upon a plain sheet of paper. The paradoxical or cosmographical embraces longitude, latitude, and distance, the getting together many horizontal courses into one "infallible and true," i.e., what is now called traverse

and Mercator's sailings. His "paradoxical course" he describes correctly as a rhumb line which is straight on the chart and a curve on the globe. He points out the errors of the common or plane chart, and promises if spared to publish a "paradoxall chart." It is not known whether such a chart appeared or not, but he assisted Wright in producing his chart a few years later. His list of instruments necessary to a skillful seaman comprises the sea compass, cross-staff, chart, quadrant, astrolabe, an "instrument magnetical" for finding the variation of the compass, a horizontal plane sphere, a globe, and a paradoxical compass. The first three are sufficient for use at sea, the astrolabe and quadrant being uncertain for sea observations. The importance of knowing the time of the tides when approaching tidal or barred harbors is clearly pointed out, also the mode of ascertaining it by the moon's age. A table of the sun's declination is given for noon each day during four years, 1593-97, from the ephemerides of Stadius. A specimen log-book provides one line only for each day, but the columns are arranged similarly to those of a modern log. Under the head of remarks after leaving Brazil, we read, "the compass varied 9° , the south point westward." He states that the first meridian passed through St. Michael, because there was no variation at that place; the meridian passed through the magnetic pole as well as the pole of the earth. He makes no mention of Mercator's chart, nor of Cortes or other writers on navigation.

The great mark which Wright made in the world was the discovery of a correct and uniform method for dividing the meridional line and making charts which are still called after the name of Mercator. He considered his charts as true as the globe itself; and so they were for all practical purposes.

When Napier's *Canon Mirificus* appeared in 1614, Wright at once recognized the value of logarithms as an aid to navigation, and undertook a translation of the book, which he did not live to publish (see NAPIER). E. Gunter's tables (1620) made the application of the new discovery to navigation possible, and this was done by T. Addison in his *Arithmetical Navigation* (1625), as well as by Gunter in his tables of 1624 and 1636, which gave artificial sines and tangents, to a radius of 1,000,000, with directions for their use and application to astronomy and navigation, and also logarithms of numbers from 1 to 10,000. Several editions followed, and the work retained its reputation over a century. Gunter invented the sector, and introduced the meridional line upon it, in the just proportion of Mercator's projection.

The power of taking observations correctly, either at sea or on shore, was greatly assisted by the invention which bears the name of Pierre Vernier, which was published in Brussels in 1631 (see VERNIER). As Vernier's quadrant was divided into half degrees only, the sector, as he called it, spread over $14\frac{1}{2}$ degrees, and that space carried thirty equal divisions, numbered from 0 to 30. As each division of the sector contained twenty-nine minutes of the arc, the vernier could be read to minutes. The verniers now commonly adapted to sextants can be read to ten seconds. About this period Gascoigne applied the telescope to the quadrant (see MICROMETER); and Hevelius invented the tangent screw, to give slow and steady motion when near the desired position. In 1635 Henry Gellibrand published his discovery of the change in variation of the needle, which was effected by his comparing the results of his own observations with those of Burrough and Gunter. The necessity for having correct charts was equalled by the pressing need of obtaining the longitude by some simple and correct means available to seamen; and we

have seen how many plans had already been thought of for this purpose. At one time it was hoped that the longitude might be directly discovered by the variation of the compass. But the only real way of ascertaining the longitude is by knowing the difference of time at two meridians; and till the invention and perfecting of chronometers this could only be done by finding at two places the apparent time of the same celestial phenomenon. The most obvious phenomena to select were the motions of the moon among the sun and stars, which as we have seen were suggested as a means of finding the longitude by Werner in 1514, and continued to receive attention from later writers. The places of stars were derived from various and widely discrepant sources; and almanacs gave little useful information beyond the declination of the sun, the age of the moon, and the time of high water. Another class of phenomena whose comparative frequency recommended them for longitude observations, viz., the occultations of Jupiter's satellites, became known through Galileo's discovery of these bodies (1610.) Tables for these were published by Dominic Cassini at Bologna in 1688, and were repeated in a more correct form at Paris in 1693 by his son, who was followed by Pound, Bradley, Wargentin, and many other astronomers.

The study of this problem was stimulated by the reward of 1,000 crowns offered by Philip III., of Spain, in 1598; the states-general followed with an offer of 10,000 florins. King Charles II. decided upon establishing an observatory in Greenwich Park, and Flamsteed was appointed astronomical observer on March 4, 1675. Though this was not the first observatory in Europe, it was destined to become the most useful, and has fulfilled the important duties for which it was established. It was established to meet the exigencies of navigation, as was clearly stated on the appointment of Flamsteed, and on several subsequent occasions; and we see now what an excellent foster-mother it has been to the higher branches of that science. The government did not provide a single instrument. Flamsteed entered upon his important duties with an iron sextant of seven feet radius, a quadrant of three feet radius, two telescopes, and two clocks. Tycho Brahe's catalogue of about a thousand stars was his only guide. In 1681 he fitted a mural arc which proved a failure. Seven years after another mural arc was erected with which he set to work in earnest to verify the latitude, and to determine the equinoctial point, the obliquity of the ecliptic, the right ascension and declination of the stars, till he numbered two or three thousand which appeared in the "British catalogue." (See FLAMSTEED and ASTRONOMY.)

Flamsteed died in 1720, and was succeeded by Halley, who paid particular attention to the motions of the moon with a view to the longitude problem. A paper which he published in the *Phil. Trans.*, 1731, No. 421, shows what had been accomplished up to that date, and proves that it was still impossible to find the longitude correctly by the moon.

From the year 1714 the history of navigation in England is closely associated with that of the "commissioners for the discovery of longitude at sea," a body constituted by Act 13 Anne, c. 14, with power to grant sums not exceeding £2,000 to assist experiments and reward minor discoveries, and also to judge on applications for much greater rewards which were offered to open competition. For a method of determining the longitude within sixty geographical miles, to be tested by a voyage to the West Indies and back, the sum of £10,000 was offered; within forty miles, £15,000; within thirty, £20,000. The suggestions and applications sent in to the commissioners were naturally very

numerous and often very trifling; but they sometimes furnish useful illustrations of the state of navigation.

One of the first points to which the attention of the commissioners was directed was the survey of the coasts of Great Britain, which was pressed on them by Whiston in 1737. He was appointed surveyor of coasts and headlands, and in 1741 received a grant for instruments. An act passed in 1740 enabled the commissioners to spend money on the survey of the coasts of Great Britain and the "plantations." At a later date they bore part of the expenses of Cook's scientific voyages, and of the publication of their results. Indeed it is to them that we owe all that was done by England for surveys of coasts, both at home and abroad, prior to the establishment of the hydrographic department of the Admiralty in 1795. But their chief work lay in the encouragement they gave on the one hand to the improvement of timepieces, and on the other to the perfecting of astronomical tables and methods, the latter issuing in the publication of the *Nautical Almanac*.

The introduction of timekeepers by which Greenwich time can be carried to any part of the world, and the longitude found with ease, simplicity, and certainty is due to the invention of John Harrison. The idea of keeping time at sea was no novelty. HUYGENS (*q.v.*) made pendulum watches for the purpose prior to 1665, at which date Major Holmes communicated to the Royal Society (*Phil. Trans.*, i. 13) the fact of his having tried two of them on the coast of Guinea. He sailed from St. Thomas, set his watches, sailed west 700 or 800 leagues, without changing course, then steered toward the coast of Africa north-northeast 200 or 300 leagues. The masters of the other ships under his charge, fearing the want of water, wished to steer for Barbados. Holmes, on comparing the calculations, found them to differ from him from 80 to over 100 leagues. He considered that they were only thirty leagues from the Cape Verd Islands, where they arrived next afternoon.

Harrison's great invention was the principle of compensation through the unequal contraction of two metals, which he first applied in the invention of the compensation pendulum, still in use, and then modified so as to fit to a watch, devising at the same time a means by which the watch retains its motion while being wound up. To what has been said in the article HARRISON on his successive attempts, and the success of the trial journey to Jamaica in 1761-62, it may be added that by the journal of the House of Commons we find that the error of the watch (as if there were only one) was ascertained by equal altitudes at Portsmouth and Barbados, the calculations being made by Short. The watch came greatly within the limits of the act.

One might have supposed that Harrison had now secured the prize; but there were powerful competitors who hoped to gain it by lunars, and a bill was passed through the House in 1763 which left an open chance for a lunarian during four years. A second West Indies trial of the watch took place between November, 1763, and March, 1764, in a voyage to Barbados, which occupied four months; during which time it is said, in the preamble to Act 5 Geo. III., 1765, not to have erred ten geographical miles in longitude. In February, 1765, the commissioners of longitude expressed an opinion that the trial was satisfactory, but required the principles to be disclosed and other watches made. Half the great reward was paid to Harrison under Act of Parliament in this year, and he and his son gave full descriptions and drawings, upon oath, to seven persons appointed by the commissioners of longitude. The other half of the great reward was promised to Harrison when he had made other timekeepers to the satis-

faction of the commissioners, and provided he gave up everything to them within six months. The second half was not paid till 1773, after trials had been made with five watches. These trials were partly made at Greenwich by Maskelyne, who, as we shall see, was a great advocate of lunars, and was not ready to admit more than a subsidiary value to the watch. A bitter controversy arose, and Harrison in 1767 published a book in which he charges Maskelyne with exposing his watch to unfair treatment. The feud between the astronomer-royal and the watchmakers continued long after this date.

Meantime the steady progress of astronomy both by the multiplication and increased accuracy of observations, and by corresponding advances in the theory, had made it possible to construct greatly improved tables. In observations of the moon Greenwich still took the lead; and it was here that Halley's successor Bradley made his two grand discoveries of aberration and nutation which had added so much to the precision of modern astronomy. Kepler's Rudolphine tables of 1627 and Street's tables of 1661, which had held their ground for almost a century, were rendered obsolete by the observations of Halley and his successor. At length, in 1753, in the second volume of the *Commentarii* of the Academy of Göttingen, Tobias Mayer printed his new solar and lunar tables, which were to have so great an influence on the history of navigation.

In 1761 Maskelyne was sent to St. Helena to observe the transit of Venus. On his voyage out and home he used Mayer's printed tables for lunar determinations of the longitude, and from St. Helena he wrote a letter to the Royal Society, in which he described his observations made with Hadley's quadrant of twenty inches radius, made by Bird, and the glasses ground by Dollond. He took the observations both ways to avoid the errors. The arc and index were of brass, the frame mahogany; the vernier was subdivided to minutes. The telescope was six inches long, magnified four times, and inverted. On his return to England Maskelyne prepared the *British Mariner's Guide* (1763), in which he undertakes to furnish complete and easy instructions for finding the longitude at sea or on shore, within a degree, by observing the distance between the moon and sun, or a star, by Hadley's quadrant. The errors which he said were inseparable from the dead-reckoning "even in the hands of the ablest and most skillful navigators," amounting at times to fifteen degrees, appear to be overestimated. On the other hand, the lunar equations, which were from Mayer's tables, would, he believed, always determine the longitude within a degree, and generally to half a degree, if applied to careful observations.

In 1765 Maskelyne became astronomer-royal, and was able to give effect to his own suggestion by organizing the publication of the *Nautical Almanac*. The same Act of 1765 which gave Harrison his first £10,000 gave the commissioners authority and funds for this undertaking. Mayer's tables, with his MS. improvements up to his death in 1762, were bought from his widow for \$15,000; \$1,500 was granted to the famous mathematician Euler, on whose theory of the moon Mayer's later tables were formed; and the first *Almanac*, that for 1767, was published in the previous year, at the cost and under the authority of the commissioners of longitude. This was not the first almanac in the country, perhaps by a hundred, as that name was applied to small periodical works, frequently of a frivolous character—though the later and better description gave the sun's declination and moon's meridional passage approximately. In 1696 the French nautical almanac for the following year appeared, an

improvement on what had been before issued by private persons, but it did not attempt to give lunar distances. In the English *Nautical Almanac* for 1767 we find everything necessary to render it worthy of confidence, and to satisfy every requirement at sea. The great achievement was that of giving the distance from the moon's center to the sun, when suitable, and to about seven fixed stars, every three hours. The mariner has only to find the apparent time at ship, and clear his own measured distance from the effects of parallax and refraction (for which at the end of the book are given Lyon's and Dunthorn's methods), and then by simple proportion, or proportional logarithms, find the time at Greenwich. The calculations respecting the sun and moon were made from Mayer's last manuscript tables under the inspection of Maskelyne, and were so continued till 1804. The calculations respecting the planets are from Halley's tables, and those of Jupiter's satellites from tables made by Wargentin and published by Lalande in 1759, except the fourth satellite.

From 1777 to 1788 inclusive, the moon's place was calculated from improved tables by Charles Mason, founded on observations by Bradley, which were published in the *Nautical Almanac* for 1774. The difference then only amounted to 1" in longitude, the apogee 56", and the ascending node 45". From 1789 to 1804 the tables were further corrected by Mason, and calculated to tenths of a second. The distances between the moon and the stars were still further corrected by the use of Taylor's logarithms to seconds, and their places by Bradley's observations in 1756 and Maskelyne's in 1809. The places of the planets at that time were from Lalande's *Astronomy* (the third edition was published in 1792), more recently from vol. iii. of Professor Vince's *Astronomy*. The places of the moon since the beginning of 1821 were calculated from Burckhardt's tables. They are now taken from Hansen's tables, completed with the aid of the English Government in 1857. The eclipses of Jupiter's satellites for 1824 and following years were from Delambre's new tables. In 1827 the positions of sixty of the principal stars were given for every tenth day, from the tables of Maskelyne and Doctor Pearson. Since 1824 the work has been printed three and latterly four years in advance.

The plan of the *Nautical Almanac* was soon imitated by other nations. In France the Académie Royale de Marine had all the lunar distances translated from the British *Nautical Almanac* for 1773 and following years, retaining the Greenwich time for the three-hourly distances. The tables were considered excellent, and national pride was satisfied by their having been formed on the plan proposed by Lacaille. They did not imitate the mode given for clearing the distance, considering their own better.

Though the Spaniards were leaders in the art of navigation during the sixteenth and seventeenth centuries, it was not till November 4, 1791, that their first nautical almanac was printed at Madrid, having been previously calculated at Cadiz for the year 1792. They acknowledge borrowing from the English and French.

After Maskelyne's death the correctness and reputation of the *Nautical Almanac* underwent a serious decline. The matter came before parliament in 1818, when the board of longitude was reconstructed, and the old acts consolidated. Dr. T. Young was appointed secretary to the commissioners, and superintendent of the *Almanac*. Ten years later, in 1828, the board was swept away, the *Almanac* was placed under the Admiralty, and Young, with Faraday as a chemist and Sabine as a practical observer, were appointed scientific advisers to the Admiralty, which ever since has spent a certain annual sum on scientific research.

The ultimate result of these controversies was the appearance of the new and reformed *Nautical Almanac* in 1834. It may be added that the last remnant of the old laws, the protection of the *Almanac* against competition by a penalty, was abolished by an act passed August 6, 1861. The sale of the *Nautical Almanac* has lately decreased on account of the amount of information given in private publications.

Prior to 1795 the nautical portion of the British community, including the royal navy, were entirely dependent upon private industry and enterprise for charts and sailing directions. On August 12th of that year an order in council placed all such articles as were then in the possession of the Admiralty in charge of Mr. Dalrymple, an eminent publisher of such things, who had long been employed by the East India Company, and whose catalogue in 1786 contained 347 charts between England, the Cape, India, and China; thus the germ of the hydrographic department was established. The expense was then limited to \$3,250 a year, just one-tenth of what was allowed last year for drawing and engraving charts alone, besides \$27,500 for printing and mounting them. In 1881 there were 118,542 charts sold.

The question of the accuracy with which the sea charts now represent a portion of the globe is entirely set at rest by the possession of a correct knowledge of the figure and size of the earth, as well as the means of ascertaining the latitude and longitude of innumerable places (see EARTH and GEOGRAPHY). They are now made as precisely as possible to represent the actual surface of the globe. The result of each survey is first plotted with the meridian lines inclined toward the pole, by which means all astronomical bearings coincide. It is afterward opened proportionately to suit Mercator's projection and the sailor's use, as far as 70 or 80 degrees. For the polar regions a circular projection is used, which may comprise a radius of 30 or even 40 degrees.

At the commencement of the present century all watches designed for the discovery of the longitude were called "chronometers;" they were but slowly coming into general use; the Admiralty only supplied them to flagships, surveying ships, and exploring expeditions. Later every ship of war was allowed one, and an additional one if the captain possessed one of his own. The East India Company allowed their ships one each at an early date. Now flagships are allowed five, and ordinary ships of war three each. Chronometers were soon recognized as a certain and simple means of ascertaining the difference of longitude between two places; Captain Cook and others used them in the last century. The elaborate chronometric expeditions of English, Continental and American astronomers belong rather to the history of astronomy. When the Atlantic cable was laid to Newfoundland in July, 1866, and time-signals received direct from Greenwich Observatory to Heart's Content, the Admiralty chart was found to be quite correct. In a similar manner all the principal places in North and South America and the West India Islands have been connected by time-signals with the United States observatories within the last seven years, and found to be fairly correct, the error seldom amounting to two seconds in time. The observatory at Lisbon was found to differ eight seconds of time. It may now be assumed that there is no place within the ordinary navigable parts of the ocean where an error in position exists of sufficient amount to affect a ship's safety.

NAVIGATION LAWS. These laws are a branch rather of municipal law than of the general maritime law (for which see SEA LAWS). They are based upon the right of a state to regulate the navigation of its own

waters and to protect its own commerce, and may be divided into two classes.

The first class includes all those laws, once so numerous, designed to secure a commercial monopoly to the state which enacted them. Any advantages which a British ship has, *e.g.*, the right of claiming protection for her flag, the non-attachment to her of a maritime lien for necessities supplied in a British port, are not directly connected with the policy under which the Navigation Acts have become obsolete. These advantages are not secured to a British ship until she is registered. American law agrees with British in this respect. The United States have imitated the policy of England and other commercial nations in conferring peculiar privileges upon American-built ships and owned by our own citizens. The object of the Registry Acts is to encourage our own trade, navigation, and shipbuilding by granting peculiar or exclusive privileges of trade to the flag of the United States, and by prohibiting the communication of those immunities to the shipping and mariners of other countries. It may be noticed that an alien is generally incapable of becoming the owner of a ship. This incapacity is specially preserved in the case of British ships by the Naturalization Act, 1870.

The second class of navigation laws includes those which deal with the navigation of any waters over which a state has any control, and embraces all that is necessary for the due use of such waters, as rules of the road, management of harbors and lighthouses, and licensing and control of pilots. Such laws may deal with (1) the high seas, (2) tidal waters other than the high seas, (3) non-tidal waters. The claims of various nations to dominion over parts of the high seas have now become matters of merely historical interest. Such claims have been at different times advanced by Great Britain, Holland, Spain, and Portugal, and were once sufficiently important to evoke the *Mare Liberum* of Grotius, and the *Mare Clausum* of Selden. But, though such claims upon the high seas have long been relinquished, rules for the navigation of the high seas may still be promulgated by any government. In Great Britain such rules have been made by order in council under the powers of the Merchant Shipping Act, 1862; the rules at present in force are those contained in the order of August 14, 1879. To these rules all the states of Europe except Turkey, and in America the United States, Chili, Brazil, and Ecuador, have assented, so that as far as the assenting states are concerned they are of universal validity. In the case of a state which has not assented to them, the only rules enforceable are the general rules of the sea, gradually ascertained by individual cases before courts of admiralty.

For navigation of its tidal waters—so far as they are territorial—a state may legislate without the assent of other states.

Non-tidal waters, even though navigable, are in Great Britain *prima facie* private waters, in which the right of navigation does not exist as a public franchise, but can only be acquired by prescription, founded on a presumed grant by an owner. In Roman law and in the Code Napoléon it is otherwise. Navigable rivers in those systems are always *publici juris*, whether tidal or non-tidal.

The distinction drawn in the United States between navigable and boatable rivers seems to be peculiar to this country, unless indeed it is analogous to the “*fleuves et rivières navigables ou flottables*” of the Code Napoleon, §538. It is at least unknown in Great Britain.

The international law as to the navigation of the high seas has been sketched above. As to territorial waters,

it is the general though not the universal opinion of jurists that the state to which the territorial waters belong has a right to forbid their navigation by foreigners. The free navigation of rivers has often been the subject of treaties, almost necessarily so where the river is the boundary between two states. In such a case, if a state were to maintain the strict letter of its rights, navigation would be almost impossible, as each state is proprietor down to the middle line of the bed of the river. By the treaty of Vienna in 1815 it was provided that the navigation of all rivers separating or traversing the states that were parties thereto should be open for commercial purposes to the vessels of all nations, subject to a uniform system of police and tolls. The treaty of Paris, 1856, extended this principle to the Danube. In America the cases of the Mississippi and the St. Lawrence are important. By the treaty of Versailles, 1783, it was provided that “the navigation of the Mississippi shall forever remain free and open to the subjects of Great Britain and the citizens of the United States.” But the United States afterward acquired Louisiana and Florida; and, the stipulation as to British subjects not being renewed in the treaty of Ghent, 1814, the United States maintain that the right of navigating the Mississippi is vested exclusively in their citizens. As to the St. Lawrence, after disputes for a long period between Great Britain and the United States, the right of free navigation for purposes of commerce was secured to the United States by the treaty of Washington, 1871. There are some waters, such as the Bosphorus and the Suez Canal, which are subject to peculiar engagements by treaty or agreement. But as a rule it may be said that in time of peace the territorial waters of a state are open to foreigners for commercial purposes, subject to observance of any rules as to police, pilotage, etc., imposed by the state.

NAVIGATORS' ISLANDS, or SAMOA, a group in the southern Pacific, 420 miles northeast of the Fiji Islands. It numbers in all thirteen islands, but most of these are little more than barren rocks, and three only—Sawaii (Pola), Upolu (Oyalava), and Tutulia (Mauna)—are large enough to be of any importance. Sawaii (700 square miles) is almost entirely occupied by lofty and barren mountains. Upolu (550 square miles) is also mountainous, but it is well-wooded and fertile, and possesses several considerable streams. Apia, the chief town, lies at the head of an oval bay on the north coast. Since 1879 it has been under a municipality directed by the consuls of Germany, Great Britain, and the United States. Tutulia (fifty-five square miles, seventeen miles long and five broad) is almost cut in two by the harbor of Pago-pago (Pango-pango), one of the best in the South Pacific. In general character the island is like Upolu. The Samoans are physically a fine race of men, and those on Upolu are all nominally Christian; but they discover a great lack of industry and perseverance. A series of petty wars continued with little intermission from 1868, has greatly interfered with the prosperity of the native population, whose numbers have decreased from 56,600 in 1840 to 35,000 in 1872 and 30,000 in 1890.

NAVY. A comparison of the matériel of modern navies would be very misleading if it only took into account the number and power of the regular ships of war, because for some important services there is but little difference between the value of the ship built for war purposes and of that only adapted to such purposes at need. The increasing vulnerability of the ship of war, however carefully built, to weapons which the adapted merchant ship can employ is one of the most notable features in the modern aspect of maritime warfare. The statesman who desires to

estimate the naval resources of empires or states will need to consider the quality and extent of their mercantile marine in fast steamships and trained men as well as the number and efficiency of their regular ships of war, and their actual war personnel. A comparison limited to armored or ironclad ships is vitiated by the defect that it does not account for the protection afforded to what are called unarmored ships by other means than that of armoring their sides. This is fast becoming so considerable that a new term has been introduced (protected ships) to distinguish such vessels from ordinary unarmored fighting ships.

The American navy came into existence shortly after the Declaration of Independence. The first force, consisting of purchased vessels, badly fitted and built, and insufficiently equipped and manned, embraced two ships of twenty-four guns each, six brigs, carrying from ten to twelve guns each, two schooners, each with eight guns, and four sloops, three of ten guns and one of four guns. In November, 1776, the grades of admiral, vice-admiral, rear-admiral, and commodore were assimilated in rank and precedence to relative army titles, but they were never created by law until 1862. During the war a number of spirited engagements occurred, but there was a great lack of efficient material at home, and agents abroad were not able to enlist the active sympathies of nations or rulers. Benjamin Franklin did manage to equip one good squadron, but this was rendered almost useless by internal dissensions, and it required the victory of Paul Jones in the *Bon Homme Richard* over the *Serapis* to bring about any tangible result for the risk taken. During the war 800 vessels of all classes were made prizes, but the navy lost, by capture, eleven vessels of war and a little squadron of gun-boats on the lakes; and, with thirteen ships destroyed to avoid capture by the British, five condemned and three wrecked at sea, the country was practically without a naval force between 1780 and 1785.

Owing to the depredations upon commerce of the Barbary powers, Congress, in 1794, ordered the construction of six frigates, but the Berbers having made peace, the number of vessels was reduced one-half, and no additions were made until 1797, when the *Constitution*, *United States*, and *Constellation* were built. Trouble with France from 1798 to 1801 resulted in the formation of four squadrons operating in the West Indies; these numbered twenty-one vessels in all, and, besides capturing nearly 100 prizes, they gained experience and prestige by many short and decisive single actions. No further increase was made until 1802, when the war with Tripoli was declared; up to this time the navy had cost the country, including sites for navy-yards, only \$10,000,000.

At the breaking out of hostilities with Great Britain in June, 1812, the naval force of the United States consisted of a number of gunboats fitted for the protection of rivers and inlets, and of seventeen sea-going ships, nine of which were below the frigate class. In 1846 California was seized, and during the war the United States vessels were employed in blockading or capturing the ports upon both seaboard of Mexico, and in coöperating with the army—all hostilities ceasing in 1847 with the occupation of the city of Mexico. In 1848 Lieutenant Lynch commanded an expedition engaged on the exploration of the Dead Sea and the river Jordan; in 1856 the *Advance* and *Rescue* searched for Sir John Franklin, followed later by the expeditions of Kane and of Hartstene; in 1854 Strain made a partial survey of the Isthmus of Panama; and in 1855 Rear-Admiral John Rodgers, in the *Vincennes*, went farther into the Arctic Ocean through Behring's

Strait than any previous navigator. In 1858 the Paraguay expedition successfully finished its work; and for many years, earnestly aided by Great Britain, a squadron was employed on the coast of Africa and in the West Indies for the suppression of the slave-trade.

The Civil war broke out in April, 1861, and its naval character was marked by two leading features; the first was that, while one side had a small force of naval vessels, which were generally good of their kind, the other entered the contest with absolutely nothing that could be called a man-of-war; the second was that, though certain developments in the character and construction of ships and weapons had been foreshadowed before the war, and had even been partially realized, it was during the progress of the struggle that those changes took place in marine warfare which amounted to a revolution. The effect of rifle and shell-fire, the employment of the ram, the destructive energy of torpedoes, the application of armor to the sides of vessels, and the superiority of iron-armored ships—all taught in practice what theory had in vain asserted.

Since the close of the war the United States navy has been doing excellent service in the peaceful pathways of science and humanity, the only warlike demonstrations having been that against Formosa in 1867 and that against Corea in 1870. Expeditions have been sent to the Arctic Ocean; ships have been employed in the survey of every sea; deep-sea soundings have been made both in the Atlantic and in the Pacific; and five expeditions have tried to solve the problem of the best route for a trans-isthmian and inter-oceanic canal; scientific observers have occupied stations, and with important results, in the transit observations, and to-day the chain of telegraphic measurements of longitude around the whole world is the work of American naval officers.

During the revolutionary war Congress through its committees and agents managed naval affairs. In 1789 these duties were intrusted to the secretary of war, and it was not until 1798 that the "department of the navy" was established. The bureaus are—(1) navigation, which controls all matters relating to pilotage and navigation, with a direct superintendence of the naval observatory and of the hydrographic, signal, naval intelligence, *Nautical Almanac*, war record, compass, and detail offices—this last having charge of the *personnel* of the service; (2) ordnance, which administers all artillery, ordnance and torpedo matters; (3) equipment and recruiting, which is in charge of outfits, equipments, stores, recruiting, and apprenticeships; (4) yards and docks, which superintends the construction of docks, naval grounds, buildings, and all civil-engineering work; (5) medicine and surgery; (6) provisions and clothing, which is responsible for the supplies of food, water and clothing, and manages the accounts, thus performing under one direction these duties relegated in the army to the quartermaster, commissary, and paymaster; (7) steam engineering, which designs and has the care of engines and boilers; and (8) construction and repair, which performs the same duties for ships. The first four bureaus are under the direction of line-officers of the navy.

The Naval Asylum is situated at Philadelphia; and at Newport, R. I., are the headquarters of the torpedo station and of the training system for apprentices. The naval experimental battery is at Annapolis, though not a part of the Naval Academy; and in all the large seaboard towns are rendezvous for the shipping of men, and branches of the hydrographic office for the dissemination of maritime information.

The coast survey and lighthouse establishment, both mainly in charge of naval officers, the revenue marine, life-saving, steamboat inspection, and marine hospital services are all a part of the treasury department; the transfer of their control to the navy department is asked of Congress by the secretary of the navy, who also recommends the establishment, under his administration, of a bureau of mercantile marine, the duties of which will be analogous to those of the mercantile marine department of the Board of Trade.

In describing the navies of to-day it is necessary to abandon all old ideas of what they were, or looked like, and to consider the details of an enormous and radical change. The old sailing frigate, an imposing monster of the sea, has gone, and the present generation will know nothing of the towering masts, the enormous spread of canvas, the rows of guns tier above tier, the swarms of sailors. The smallest vessel of the present American squadron, with her six guns, would destroy an entire fleet of "Constitutions" or "Arethusas." The seaman is now also a soldier. He is an expert in the intricate machinery of revolving cannon and the complications of the rifled breech-loader that weighs more than twenty tons and can be raised, lowered and turned by one man. He must understand the hydraulics and hydrostatics that are connected with his daily drill. He has a magazine rifle and a self-cocking revolver. A crew of 180 men comprises expert electricians, machinists, and boiler-makers. The articles issued to the crew include the general supplies of a small town, with razors, tobacco and whisk-brooms, but no "grog." There is a library. There is a tailor with a sewing-machine, and an equipped barber's shop. Yet the old qualities must remain. These new sailors are as capable as ever of battling for life against wind and wave, or of fighting like demons amid the roar of guns and the smoke of battle.

The study of the modern navy is also the study of artillery and fighting-machines of all kinds. We have brought the torpedo almost to perfection, and have all the kinds that any nation has, with an aerial one exclusively our own, which is the Zalinsky pneumatic gun. Tubes connected with chambers of compressed air throw two hundred pounds of explosive gelatine a mile. This missile, falling within a radius of 25 feet of her, will sink any iron-clad afloat. One little shell, well aimed, from a four-inch rifle, will disable the biggest gun of an enemy, and a small active vessel has it in her power to sting to death a floating castle. In structure and appearance startling innovations have come about. Ancient ideas have been revived in the ram, with a huge steel beak, and in the castellated battle-ship which rises from the water like some unique shore defense in which masts, spars, cordage, and canvas are all discarded, whose battlements bristle with machine guns, and whose thick steel sides can brave with indifference all the power of mere gun-powder and iron.

The present navy of the United States may be said to have been begun as recently as 1889. There were at that date only projected the two armored vessels, Maine and Texas, and the coast defense ram Monterey. The report of the navy department for that year strongly recommended the building of first-class fighting ships, and an Act of Congress, of June, 1890, authorized the beginning of our present navy, growing year by year since that date, in providing for the construction of three sea-going ships costing about \$3,000,000 each.

At that time there was not in this country a plant that could make an armor-plate or produce a modern rifle. A policy of delay was adopted, much criticized

at the time, by which appropriations could be accumulated until the aggregate would tempt the establishment of the costly machinery necessary. The plan succeeded, and we now build our own ships and our own guns, the latter of which are unquestionably the best made in the world. The change was necessarily radical. Previous to that we had been content with smooth-bores, 9 inch, wherewith ten pounds of powder pushed a 70 pound projectile with an energy of 847 foot-tons. Now, 10 inch rifles, with 425 pounds of powder, push with a power of 25,990 foot-tons a projectile weighing 850 pounds, adequate to pierce any iron-clad afloat. One lieutenant immediately proceeded to invent rapid-fire guns, 4 inches to 6 inches caliber, capable of piercing four inches of steel armor at 1,000 yards, and strike a 6-foot target at that distance five times in thirty-one seconds.

The appropriations for the creation of the new navy of the United States provide for the most effective armament ever constructed, and provision for defense is as adequate as that for offense. The bows are powerful rams, and bow and stern can be shot away without endangering the ship. In the latest projections it is intended to produce ships absolutely without parallel in the world. They have the combination of sufficient armament, with complete protection against ordinary modern guns, while they have a sea-speed and endurance hitherto unknown to ships of war. They are equipped with triple-expansion engines, 3 screws, 20,000 horse-power easily developed, a speed of 22 knots, and steaming at 10 knots can travel a distance of 25,520 miles without re-coaling.

Building and launching at a rate of three or four a year, any list of these vessels would in a short time be incomplete. The following list will convey some idea of the present navy. The change, as stated, is not so much in number as in kind, quality and effectiveness, and in that contrast between the old and the new which is the chief item now to be considered.

Among vessels of the first rate are the Chicago, 4,500 tons; Baltimore, 4,400 tons; Philadelphia, 4,324 tons; Newark, 4,083 tons; San Francisco, 4,083 tons, all protected cruisers. Of the second rate are the Maine, 6,648 tons; Texas, 6,300 tons, both armored steel vessels, and the Charleston, 3,730 tons; Atlanta, 3,000 tons; Boston, 3,000 tons; Lancaster, 3,250 tons; Pensacola, 3,000 tons; Hartford, 2,900 tons; Richmond, 2,700 tons; Omaha, 2,400 tons, all armored steel vessels. Of third rates there are the Puritan, Amphitrite, Miantonomoh, Monadnock, Terror, all double-turreted monitors. There are thirteen single-turreted monitors whose machinery and armament are obsolete, but whose hulls are first-class, which lie under paint and canvas to await an emergency. There are also some 18 old-type unarmored cruisers, while the Yorktown, Bennington, Concord and Dolphin are steel vessels of new design. The Petrel is the only modern vessel now finished among the fourth rates, this is of 885 tons displacement. There are two torpedo boats, 11 tugs and 15 sailing vessels and receiving ships.

To the above may be added, some of them building and several already launched, three steel-belted battle-ships of 10,200 tons each; one armored steel cruiser of 8,100 tons; one barbette-turret coast-defense vessel of 4,048 tons; one harbor-defense ram of 2,050 tons; two protected cruisers of 7,400 tons each; one of same class of 5,500 tons; two of same of 3,183 tons; three of same of 2,000 tons; two gun-boats of 1,050 tons; one practice-vessel of 838 tons for the use of the naval cadets; three tugs of 192 tons each. The harbor-defense ram "Katahdin" was launched Feb.

4th, 1893, and this vessel is unique in having tanks for submerging the vessel in action until nothing but her invulnerable "turtle" back is exposed to fire, and in being able to steam thus seventeen knots an hour. There are also building the Iowa, a battle-ship, to cost more than three millions of dollars, and the Brooklyn, an armored cruiser to cost nearly three millions. Also the Olympia, a cruiser of the class of the Chicago and Charleston, to make twenty knots an hour, and to carry an armament of four 8-inch breech-loading guns, ten 5-inch rapid-fire guns; fourteen 6-pounders, and six 1-pounder rapid-fire guns. This vessel will cost nearly two millions.

In the United States Navy there are under present regulations 6 Rear-Admirals, 10 Commodores, 45 Captains, 85 Commanders, 74 Lieutenant Commanders, 250 Lieutenants, 75 Junior Lieutenants, 184 Ensigns. There are 15 Medical Directors, 15 Medical Inspectors, 50 Surgeons, 90 Assistant Surgeons. There is a pay-corps numbering about 100 officers. The Chief and Assistant Engineers number about 208 persons. There are 23 Chaplains, and 12 Professors of Mathematics, with 7 Naval Instructors, 14 Assistants and 10 Civil Engineers. There are upon the present footing 7,500 sailors and 750 apprentices.

The Marine Corps, by which term is designated that body of infantry soldiers whose duties are confined to the navy, has 1 Colonel, 2 Lieutenant Colonels, 5 Majors, 5 of General Staff, 20 Captains, 39 First and Second Lieutenants, and 2,000 rank and file.

The most startling innovation of our navy is that unique vessel whose ammunition is compressed air, whose guns are long tubes without trunnions, and whose destructive qualities have been referred to above. Trials of this naval monster have demonstrated a utility which may yet cause all the splendid armaments mentioned to seem in vain.

NAYLER, or NAYLOR, JAMES, a Puritan fanatic, was born at Andersloe or Ardsley in Yorkshire, England, in 1618, and died in 1660.

NAZARENES, an obscure Jewish-Christian sect or "heresy," existing at the time of Epiphanius in Cœle-Syria, Decapolis (Pella), and Basanitis (Cocabe). According to that authority they dated their settlement in Pella from the time of the flight of the Jewish Christians from Jerusalem, immediately before the siege in 70 A.D.; he characterizes them as neither more nor less than Jews pure and simple, but adds that they recognized the new covenant as well as the old, and believed in the resurrection, and in the one God and His son Jesus Christ.

NAZARETH, in Galilee, now al-Nasira, the city of Mary and Joseph, and the place where our Lord spent his youth, is pleasantly situated in a hollow on the south slope of the hills which bound the plain of Esdraelon on the north. Though it had a synagogue, and is called in the Gospels a city, Nazareth must have been an obscure place in the time of Jesus, for we find no mention of it outside of the New Testament till Eusebius and Jerome identify it with a "village" which undoubtedly occupied the place of the modern Nasira. The place has since passed through various vicissitudes; it was most flourishing in the time of the crusaders, who transferred to it the bishopric of Scythopolis. The Ottomans at length expelled the Christians; but the Franciscans established themselves under the protection of Fakhr al-Din in 1620. The town has now a Greek, a Latin, and a Moslem quarter, as well as a Protestant mission and orphanage. The population is variously estimated at from 6,000 to 10,000.

NAZARITE, or NAZIRITE, was the name among the Hebrews for a peculiar kind of devotee. The

characteristic marks of a Nazarite were unshorn locks and abstinence from wine. Full regulations for the legal observance of the Nazarite vow are given in Numb. vi., where every product of the grape-vine is forbidden, and the Nazarite is further enjoined to abstain from approaching a dead body, even if it be that of his nearest relative.

NEAL, DANIEL, author of the *History of the Puritans*, was born in London in December, 1678. He died in 1743.

NEALE, JOHN MASON, ecclesiastical historian and hymnologist, was born in London, January 24, 1818, and was educated at Trinity College, Cambridge. He became incumbent of Crawley, Sussex, in 1842, and in 1846 warden of Sackville College, East Grimstead, an appointment which he held till his death, August 6, 1866.

NEANDER, AUGUST, one of the most distinguished and influential of the modern theologians of Germany, was born of Jewish parents at Göttingen, on January 17, 1789.

Neander's life was only varied by the successive publications which appeared in such fertility from his pen. In the year 1812 he published a monograph *On St. Bernard and his Age*, and then in 1818 his work on Gnosticism. A still more extended and elaborate monograph than either of the preceding followed, *On Chrysostom*, and again, in 1825, another on Tertullian. He had in the meantime, however, begun his great work, to which these several efforts were only preparatory studies. The first volume of his *General History of the Christian Religion and Church*, embracing the history of the first three centuries, made its appearance in 1826. The others followed at intervals—the fifth, which appeared in 1845, bringing down the narrative to the pontificate of Boniface VIII. A posthumous volume, edited by Schneider in 1852, carried it on to the period of the council of Basel. Besides this great work he published in 1832 his *History of the Planting and Training of the Christian Church by the Apostles*, and in 1837 his *Life of Jesus Christ, in its Historical Connection and Development*, called forth by the famous *Life of Strauss*. In addition to all these labors, he gave to the public many miscellaneous sketches from the history of the church and of theological opinion; as, for example, his *Memorabilia from the History of Christian Life* (1822), his volume under the title of the *Unity and Variety of the Christian Life*, his papers on Plotinus, Thomas Aquinas, Theobald Thamer, Pascal, Newman, Blanco White, Arnold, etc., and other occasional pieces (*Kleine Gelegenheitschriften*, 1829), mainly of a practical, exegetical, and historical character. Since his death a succession of volumes, representing his various courses of lectures, have appeared (1856-64), in addition to the *Lectures on the History of Dogma*, admirable in spirit and execution, which were edited by Jacobi in 1857. He died on July 14, 1850, worn out and nearly blind with incessant study.

NEANDER, JOACHIM, German hymn-writer, was born about 1650 and died in 1680.

NEARCHUS, son of Androtimus, one of the most distinguished officers in the army of Alexander the Great, and admiral of his fleet, with which he made an important and interesting voyage of discovery in the Indian Ocean. He was a native of Crete.

The voyage of Nearchus has acquired a much greater celebrity than it really deserves, both in ancient and in modern times, from the circumstance that it stood entirely alone in antiquity, the similar expedition of Hanno along the west coast of Africa being almost unknown to both the Greeks and Romans, while in modern days it has attracted a greatly increased amount of

attention from the accidental circumstance that a complete and trustworthy record of it has been preserved. Nearchus himself wrote a detailed narrative of his expedition, of which a regular and full abstract was embodied by Arrian in his work on India—one of the most interesting geographical treatises that have been transmitted to us from antiquity.

NEATH, a municipal and parliamentary borough and market-town of Glamorganshire, South Wales, is prettily situated near the mouth of the Neath, and on two railway lines, eight miles northeast of Swansea and thirty-nine west-northwest of Cardiff.

The population of the municipal borough (1,486 acres) in 1871 was 9,319, and in 1881 it was 10,409. That of the parliamentary borough (1,629 acres) in 1881 was 11,216.

NEBRASKA, a central State of the American Union, is bounded on the south by Colorado and Kansas, on the east by Missouri and Iowa, on the north by South Dakota, and on the west by Wyoming and Colorado. The width of the State from north to south is $208\frac{1}{2}$ miles, the length from east to west 413 miles and the area 76,855 square miles, or 49,054 080 acres.

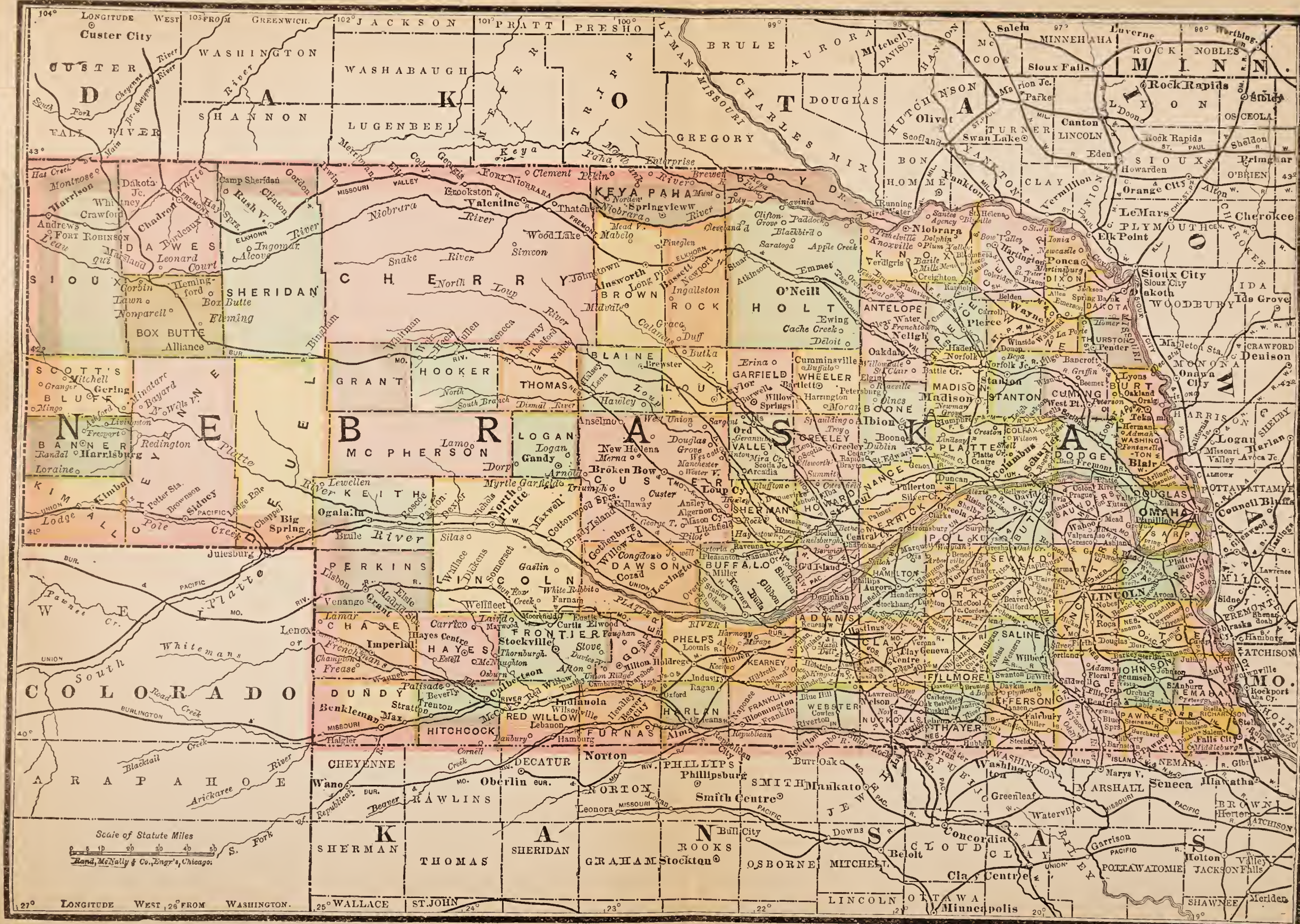
The greater part of Nebraska is a plateau. The lowest point is at the mouth of the Nemaha, in the southeastern part of the State, where the elevation is 880 feet; the highest spot is Scott's Bluffs, in the extreme western part of the State (6,000 feet). The eastern half of the State has an average elevation of 1,400 feet; and the whole State averages 2,312 feet above the sea.

There are no mountains, but in the northern and western parts there are some ridges and a few lofty hills. Generally the slopes are gentle, but occasionally precipitous, and in rare cases there are cañons with perpendicular sides. The lands of three-fourths of the State are gently rolling. The surface owes its present form mainly to erosion. Between all the forms of upland surface the transition is gradual. The bottom lands and valleys are the most conspicuous modifying features of the surface. They are huge shallow troughs, varying in breadth from a quarter of a mile on the smaller streams to twenty-three miles on the Platte and the Missouri. Their numerous terraces, like broad steps, gradually lead to the bordering uplands, which in turn are varied in height and form. Occasionally it is hard to determine where the bottom ends and the bordering bluffs begin, but generally both forms are clearly outlined. The innumerable tributaries that creep quietly into the main bottoms greatly complicate and beautify the forms of landscape. The number of these valleys is very great, the Republican alone having more than four hundred tributaries. Not less than 25 per cent. of the entire surface of the State is composed of well-watered valleys. The few destitute of water are regaining the streamlets of former times through the climatic changes brought on by the settlement of the State. Most of these bottom lands, though composed of the richest vegetable mold and alluvium modified by loess materials, are perfectly dry, and rarely subject to overflow. A clear conception of the topography can only be obtained by crossing the State at right angles to the courses of the valleys. The rolling lands bordering the valleys gradually disappear as the divide is approached which separates one drainage system from the next. Here the land swells out into a gently undulating plain that varies in extent from one to thirty miles. Some of these higher uplands have a great number of shallow basin-like depressions where soil and grasses closely resemble those of the bottom lands. They are the sites of small lakes that recently existed here, and some of them still retain this character, being

filled with fresh water from one to fifteen feet in depth. South of the valley of the Niobrara, and commencing in 100° W. longitude, are the noted sand-hills. They vary in height from a few yards to several hundred feet. Almost every form of wind sculpturing is found, but the conical predominates. Though formerly naked, these hills have recently become covered with grasses which are fixing the sands, and preserving their curious crater-like forms. They extend to the head of the forks of the Loup river, covering an estimated area of 8,000 square miles.

The average mean temperature of the summer months—June, July, and August—in eastern Nebraska is 73° Fahr. At the North Platte it is slightly higher. Excepting a small section in the northwestern part, the whole State is included between the summer isotherms of 72° and 76° . The mean temperature of the autumn months—September, October, and November—is 49° . As excessive rains rarely fall during these months, the comparatively high mean temperature renders the autumn season long and delightfully mild. The isotherm of 20° during the winter months—December, January and February—embraces all of Nebraska except the northwest corner, where the temperature is slightly lower, and the southeast corner where it is slightly higher. The spring months—March, April, and May—have a mean of 47° Fahr. The mean of the whole year is in the southern half of the State 55° , in the northern half $52\frac{1}{2}^{\circ}$. Rarely does the temperature in midsummer rise to 100° . In twelve years the thermometer fell below zero on an average thirteen times a year. The lowest point ever reached was 32° below zero. The heat of summer is constantly modified by breezes. Owing to the dryness of the atmosphere the cold is not felt more when the thermometer registers -20° than in moist regions when it marks only zero. In winter the prevailing winds are from the northwest, changing, as spring advances, to the southwest, from which direction they mainly blow through summer and autumn. During some winters there are occasional wind-storms of great severity, preceded by a fall of snow and followed by very low temperature. Such storms last from one to three days, and when they cease the temperature reaches the lowest point experienced in this region. The extreme cold continues for a few days only. Fortunately the severe types of such storms are rare even here, and the winters on the whole are remarkably adapted to continuous labor in the open air. The atmosphere is wonderfully clear and pure throughout the year; objects can be seen at a great distance, and clouds when formed are outlined with exceptional clearness.

The rainfall in eastern Nebraska is abundant. At the Missouri it averages forty inches a year; 100 miles farther west thirty-two inches; 200 miles west of the eastern boundary thirty inches. Beyond this point it more rapidly lessens until the North Platte is reached in western Nebraska, where the average is only twenty inches. In the end of May, or in early June, when the "big rise" of the Missouri and the Platte occurs, a rainy season invariably commences which lasts from three to eight weeks. As this is the time when crops most need rain, destructive droughts are rare in eastern Nebraska. After the wet season rains still occur, but at longer intervals. During winter rain rarely falls. Snow ranges in depth from one to ten inches. There are many facts that show a constantly increasing rainfall in the State. One reason for this is believed to be the great depth of the soil, and the great increase of absorption produced by cultivation. The loess soils, of which the surface of Nebraska is largely composed, only need the native sod to be broken up to be trans-



muted into a huge sponge absorbing all the moisture that falls on it.

Nebraska is exceptionally healthy, especially for persons of consumptive tendency. This is owing to its elevation above the sea, the dryness of the atmosphere, and the great amount of ozone in it, the prevalence of winds, and the fine natural drainage of the State. The diseases incident to the climate are rheumatism, neuralgia, and in isolated spots malaria. With the progress of settlement, and a lessening exposure, these ailments are gradually disappearing.

In striking contrast to past geological times, there are now no large lakes in Nebraska. There are, however, a great number of small lakelets. Many of these have been formed by "cut offs" on the Missouri, Platte, Elkhorn, Blue, and other rivers. At the head of the Elkhorn river is a region containing over thirty small lakes, many of which are of great beauty, with pebbly bottoms, and water clear as crystal. A still more extensive region of small lakes is at and between the heads of the Loup rivers. At the head of Pine Creek, a tributary of the Niobrara, there are many saline lakelets and ponds. A large saline bog, fed by a vast number of saline springs, covers about 500 acres, two miles west of Lincoln. Many smaller ones exist in the same vicinity. Salt has been manufactured here in considerable quantity by solar evaporation. Springs are abundant along most of the river bluffs and on the rolling lands of eastern Nebraska. On the long reaches of nearly level land springs occur at longer intervals, and on the watersheds still more rarely. Even here water can readily be obtained by wells, from fifteen to fifty feet deep, excepting in a few counties like Clay, Fillmore, Adams, and Phelps, where, owing to the great thickness of the superficial deposits in some localities, shafting must be much deeper. Artesian wells have been successful, the depth at which flowing water has been obtained varying from 500 to 1,000 feet.

The name Nebraska signifies land of broad rivers. Chief of all is the Missouri, which flows in a tortuous course for 500 miles along its eastern boundary, and is navigable for 2,000 miles above Omaha. Next in importance is the Platte, which flows through the whole length of the State from west to east. Rising in lakelets in the Rocky Mountains, fed by snows, its entire length approximates 1,200 miles. When it enters the State it is already a broad and rapid, though shallow river, flowing over a sandy bed. At North Platte it forks, one branch being known as the South and the other as the North Platte. The Loup is the first large tributary. It rises among the sand-hills south of the Niobrara, in a group of small lakes. It has three main branches, known as the South, Middle, and North Loups, each of which in turn has many tributaries. The Middle Loup, whose main direction is southeast, is 250 miles long. The Elkhorn, which empties into the Platte a short distance above the latter's junction with the Missouri, is one of the most beautiful streams of the State. It too has its source in a region of small lakes near 99° 30' W. longitude. Here it has a remarkably broad bottom, with low bordering uplands. It flows over a rocky bottom in a southeasterly direction about 250 miles. Its principal tributaries are the North Fork and the Logan, the latter having an extraordinary number of tributaries. Near the south line of the State the Republican river and its numerous affluents drain a large area. It rises in the Colorado plains, but flows 216 miles through the State. Near the northern boundary is the Niobrara river, which rises in Wyoming, and flows 263 miles through the State before uniting with the Missouri. It is the most rapid and turbulent stream in the State. The most important of its numerous tributaries are the Keya Paha and the

Verdigris. Many other rivers in Nebraska are remarkable for the beauty and fertility of the sections which they drain, the most important being the Bows, the Big and Little Blue, the Great and Little Nemaha, and Salt Creek. The water-power of the State is enormous. Though the streams meander through broad bottoms, places can be found every few miles where the fall is from three to ten feet to the mile.

Nebraska is the meeting-place of two rather distinct floras—that of dry regions from the west, and their relatives from the moister east. Even many native Rocky Mountain plants have crept down to the plains of Nebraska. Of plants indigenous to the State 2,000 species have been collected; among these, 1,671 species are flowering plants. The *Compositæ* are represented by the largest number of species, there being 244 within the State. The sedges are represented by 151 species, though there are comparatively few individuals. The grasses are the leading vegetable forms in the number of individuals, though as yet only 147 species have been detected. Originally the short Buffalo grass was everywhere abundant, but it has almost entirely disappeared from the eastern half of the State and from large sections in its western portions, the taller blue-joint grasses taking its place. Nothing can surpass the beauty of the prairies during the summer season when covered with rank grasses and myriad flowers. Of forest trees seventy-one species are native. The leading variety in the number of individuals and forests is the cotton-wood (*Populus monilifera*), which grows luxuriantly on river bottoms and many uplands. The ash-leaved maple, soft maple, elms, various species of ash, lindens, and willows, are in various parts of the State about equal in abundance. The most valuable tree is the noble black walnut, which is extremely hardy and grows luxuriantly. The red cedar is abundant in some sections, and grows well everywhere. Two species of spruce and two of pine are found on tributaries of the Niobrara and Loup, and in the extreme western part of the State. Shrubs are represented by ninety-one species. Wild fruits abound, among which plums and grapes are most conspicuous, the former represented by three species and an endless number of varieties. The grapes are limited to timber belts, where they sometimes grow so luxuriantly as to make an almost impenetrable thicket of vines. The smaller wild fruits are widely distributed over the State.

Before the advent of the white man Nebraska was a paradise for wild animals—the buffalo, elk, deer, antelope, beaver, wolves, lynx, foxes, etc. The buffalo has been banished, but the rest are still found in the sparsely settled sections of the State. The bird fauna is well developed, being rich in genera (156); the species number at least 261. Many species of fish, molluscs, and a few reptiles are present in the streams.

No thick beds of coal have yet been discovered. The lower coal horizon is about 800 feet below the surface along the Missouri as far south as Richardson county, where the upper strata indicate a possible lower level geologically than is exposed elsewhere in the State. Thin beds of coal, from six to eighteen inches thick, are found near the surface in Cass, Otoe, Nemaha, Johnson, Pawnee, and Richardson counties; in the last occurs the best coal yet found in the State. At Aspinwall and on the State boundary it is twenty-four inches thick in places. In the southwestern part of the county a bed occurs from twenty to twenty-eight inches thick. This bed has been traced from east to west about twenty miles, and from north to south four miles. The coal is of good quality.

That the soils of the State are among the best in the world, chemical analysis and experience alike confirm.

Experience has not yet settled the question whether the alluvium of the valleys or the loess of the uplands is the more valuable. Grasses and corn (maize) are the principal products. Corn, especially, is a rarely failing crop. The root crops that grow in temperate latitudes thrive amazingly. Eastern Nebraska is eminently adapted to the growth of apples, which here attain a size, color, and flavor rarely equaled elsewhere. Grapes, plums, and cherries do equally well. Peaches, though not so sure as the former, are successfully grown south of the Platte. The strawberry nowhere reaches a better size or more luscious flavor than here. Other small fruits do almost equally well. The spontaneous growth of nutritious grasses, the ease with which cultivated varieties are grown, and the enormous yield of corn render the State peculiarly adapted for the raising of cattle, horses, sheep, and hogs. The stock industry is growing rapidly, and is at present doing most to enrich the people. No industry promises better results, however, than the planting of new forests, to which many people are devoting themselves with the most gratifying success.

The financial condition of the State is shown by the following statement: Total debt, \$449,267.35; annual charge, \$35,941.39; Gross revenue in 1889-90 (two years), \$5,622,627; gross disbursements, \$4,023,378; excess of revenue, \$1,539,249. The State school funds hold \$326,267, and the sinking fund \$123,000. Valuation, \$182,763,538; rate of tax, 6.25 mills; population, 1,058,910; valuation per capita, \$176.01; tax per capita, \$1.33.

The following gives the number and valuation of various farm animals, etc., together with the acreage and value per acre of lands, 1889: Real estate, improved, 9,521,966 acres, value, \$40,144,780; unimproved, 13,353,171 acres, value, \$30,307,241; horses, 372,829, value, \$9,425,542; cattle, 1,505,634, value, \$8,436,940; mules and asses, 43,191, value, \$993,203; sheep, 195,105, value, \$105,830; hogs, 1,238,731, value, \$1,318,975.

The following gives the total figures for various farm produce for the year 1889 together with number of trees in State: corn, 141,094,770 bushels; wheat, 11,688,358 bushels; oats, 47,151,434 bushels; barley, 4,068,845 bushels; rye, 6,966,684 bushels; flax, 1,710,371 pounds; millet, 212,839 tons; broom-corn, 11,685½ tons; potatoes, 11,372,941 bushels; trees, fruit, 3,321,808; forest, 91,126,559; grapevines, 752,822.

By the completion of the Union Pacific Railroad in 1869 a highway was made to the Pacific across Nebraska. The Burlington and Missouri River Railroad, begun in the same year, was completed to its junction with the Union Pacific at Kearney in 1872. It extended its main line during 1882 through the Republican valley to Denver, Col. In connection with both these main lines there are important branches; and in 1889 over 5,000 miles of railway had been constructed in the State. Before the Union Pacific was made, freighting across the plains was a large and profitable business. Omaha was conspicuous for its energy in securing this traffic, and grew to be the first city in Nebraska, and has ever since led the State in commerce and in manufacturing enterprises.

A basis for a free-school system was laid by Congress in the act constituting Nebraska a Territory, by which two sections of land (1,280 acres) in each township were set aside for this purpose. The State constitution of 1875 provided that all fines, penalties, and license moneys arising under the general laws of the State should be transferred to the school fund, and that the legislature should provide for the free instruction in the common schools of the State of all persons between the

ages of five and twenty-one years. The census of 1880 shows that only 2.5 per cent. of the population of Nebraska over ten years of age are unable to read—a smaller proportion of illiteracy than that of any State in the Union, with one exception, (Iowa, 2.4 per cent.)

By act of the legislature, approved June 14, 1867, a commission was appointed to locate the seat of government on any lands belonging to the State, lying either in Seward county, the south half of either Saunders or Butler county, or in that part of Lancaster county lying north of the south line of township 9 north, such location and seat of government to be called "Lincoln." The commission selected the present site of this city, then called "Lancaster," and secured to the State, from the residents of that village and vicinity, a donation of 800 acres of adjoining lands. These lands were platted, lots sold, and a part of the proceeds used in erecting the old capitol building at a cost of nearly \$85,000. By legislative authority this old building was sold for \$300, the purchaser agreeing to remove it from the site of the present "main building." The contract price for the new State-house, completed, is \$639,687.25, of which amount \$25,500 have been paid from proceeds of State lots. Contract price for improving grounds, \$57,200, which amount is to be paid out of sale of State lots.

By act of Congress, fifty sections of land were donated to the State for the erection of suitable buildings for a State prison. The commission to locate the seat of government for the State was, by the same act of the legislature, directed to locate the penitentiary of the State in Lincoln. From the records, it appears that the prison buildings and inclosing walls have cost the State \$435,391.

By act of the legislature, approved February 16, 1869, the governor, the state auditor, and the secretary of state were appointed a "commission to locate, on or near the town site of Lincoln, a site for a lunatic asylum," and they were also authorized to erect suitable buildings thereon. A building was erected on the selected site. This building was destroyed by fire, and was rebuilt. To this have been added, at different times, under several contracts, five wings or additions to the main building, kitchen, boiler-house, barn and other buildings and permanent improvements, amounting in the aggregate to \$272,413. The asylum has also other property, estimated to be worth \$70,668.05.

By act of February 22, 1875, \$10,000 were appropriated for the purpose of erecting and furnishing a building for a school for the blind, whenever the people of Nebraska City should raise and pay into the hands of the trustees for such school the sum of \$3,000 in money or property. The site to be selected by said trustees was to be within one mile of the courthouse in said city. Ten acres of land were thus secured for the school where now located, and a two-story brick with basement erected. To this have been added other buildings and improvements at an aggregate cost of \$67,888, including the first \$10,000 appropriated.

By act of the legislature of the Territory of Nebraska, Aurelius Bowen, E. H. Rogers, John S. Bowen, G. C. Monell and John McPherson were declared a body corporate under the name of the "Institute for the Deaf and Dumb." This act fixes the location of the institute at Omaha, or within three miles of the courthouse. The institute owns twenty-three acres of land and buildings and permanent improvements that have cost the State \$96,500. The superintendent estimates the value of other school property at \$22,484.

The legislature, act of February 27, 1879, established the "Nebraska State Reform School for Juvenile Offenders," to be located at or near Kearney. The land was secured and the \$10,000 appropriated by said

act used in erecting a main or official building. To this have been added five family buildings, workshop, barn, and other permanent improvements till the whole has now cost the State \$145,950.

Pursuant to act of the legislature of March 4, 1885, 320 acres of land were deeded to the State by the people of Norfolk in consideration of the location of an Insane Asylum within three miles of said city. The \$75,000 appropriated were expended in erecting a three-story brick, with basement, and by authority of subsequent legislation two wings, boiler-house, engine-house, laundry, barn, and other improvements have been made at a cost of \$96,200, making the present plant cost \$171,200.

By act of legislature approved March 5, 1885, the "Nebraska Institute for Feeble-Minded Youth" was established, and \$50,000 appropriated to erect and furnish suitable buildings at or near Beatrice. To this have been added improvements, making a total cost to the State, to date, of \$71,239.

The legislature, act of February 28, 1881, established a Home for the Friendless. Lincoln secured the location. The property has cost the State \$28,895.30. Other property, \$5,988.80.

By act of March 4, 1887, a Nebraska Soldiers' and Sailors' Home was established at Grand Island. Land was secured, and the \$30,000 appropriated by the act expended in erecting suitable buildings. Furniture and other necessary articles have been purchased by the superintendent to the amount of about \$3,000. The number of inmates, November 30, 1888, was thirty-three.

In 1890 the number of children of school age was 332,243; the number enrolled in the public schools 240,350; and the average attendance 146,139. There were 5,973 school-houses, 10,555 teachers, receiving an aggregate salary of \$2,051,349. In 1890-91 there were 513 students in the State University, of whom 208 were women.

The total county and municipal debt of Nebraska in 1890 was over 5,000,000.

History.—Nebraska was probably first visited by Europeans in 1541, in July of which year the Spanish general and explorer Coronado penetrated from New Mexico to a country which he called Quivira, and described as lying about the fortieth parallel, and abounding in buffalo, which corresponds with the region of the Platte. It was then occupied by powerful Indian tribes, whose chief ruler was Tatarax. It was subsequently revisited by Padilla, a Franciscan friar who had accompanied Coronado, and who here lost his life. No more records of visits to this region are chronicled for 200 years. About the middle of the eighteenth century French missionaries from Canada came to the Missouri, and still later a few traders found their way here. It constituted a portion of the Louisiana territory which was purchased by Jefferson from France in 1803. At that time Indian tribes still occupied the whole region. At some earlier period a more civilized race lived here who made pottery and skillful carvings, built houses and fortifications, and reared mounds which often contain the ashes of their dead. When Nebraska came into possession of the United States the Sioux Indians were most numerous. The Pawnees, Otoes, and Omahas were next in numbers and in importance. These powerful tribes have all become reduced in numbers by disease, constant wars, and privations. The Sioux, who early gained the ascendancy over the other tribes, resided in northeastern Nebraska. The eastern part of the South Platte region was occupied by the Otoes, and the western part by the Pawnees, between which tribes there were constant boundary disputes.

The first settlement by whites was made in 1847 at Bellevue, on the Missouri, nine miles south of Omaha. Here a trading post of the American Fur Company was conducted by Col. Peter A. Sarpy, a Frenchman distinguished by his knowledge of the Indians, his courage, and his enterprise. The Mormon emigration, begun in 1847, traversed several paths, one of which lay through Nebraska, which thus became generally known throughout the country. During the overland traffic to California that commenced in 1849, depots of supply were established at Bellevue, Plattsmouth, Nebraska City, and in the interior at Fort Kearney.

The act constituting Nebraska a distinct Territory, and opening its lands to settlement, was approved May 30, 1854. Its area then embraced 351,558 square miles, extending from the fortieth parallel to British America on the north, its eastern line connecting the Missouri river on the southeast with the Red River on the north, and its western line being the summit of the Rocky Mountains. In 1861 Nebraska was shorn of its extended territory by the cutting off of portions of it to form Dakota and Colorado Territories. In 1863 it was still further reduced by the formation of Idaho Territory. These curtailments left Nebraska a purely prairie State. During the first five years after the organization of the Territory the settlements rapidly increased along the Missouri. Great numbers who rushed to Pike's Peak in 1859 when the gold excitement was at its height, on their return, disappointed and disgusted, stopped and opened farms in the State. This had the effect of starting settlements in the interior. The bottom-lands of the Missouri and its tributaries had first been occupied, and it was supposed that the uplands were of inferior fertility. Now, however, these so-called "bluff-lands," composed of loess materials, began to be cultivated, cautiously at first, until experiment proved them to be of the choicest character. Pioneers then began to push out from the rivers, at first only a few miles, but finally wherever lands could be obtained, without regard to the presence or absence of bottom-lands. In 1863 the Union Pacific Railroad and in 1864 the Burlington and Missouri River Railroad began to sell portions of their lands in Nebraska, received from the general government; and this became a most potent factor in turning a tide of emigration into the State.

At the breaking out of the civil war in 1861 the population of the Territory comprised less than 30,000. Yet Nebraska furnished to the Union army during the war 3,307 officers and men. The United States census of 1890 gave Nebraska a population of 1,058,910.

In 1866 the legislature prepared a constitution for a State government, which a vote of the people confirmed by a small majority, though the opponents of the measure claimed that it was obtained by fraud. The first legislature under the State constitution met July 4, 1866. The bill to admit Nebraska as a State was passed over the president's veto, and proclaimed on March 1, 1867.

The first capital of Nebraska was at Bellevue. It was removed to Omaha in 1855, where it remained until Nebraska became a State, when it was taken to Lancaster, a town of half a dozen houses, whose name was then changed to Lincoln. The present State constitution was framed in 1875, and was ratified in the same year by the people. The first legislature under the new constitution met in January, 1877. The house of representatives consists of eighty-four, and the senate of thirty members; and the legislature meets biennially.

NEBRASKA CITY, a town in Nebraska in Otoe county, of which it is the capital, is situated on the

Missouri river, on its western bank. It is an important railroad center, and contains, among other educational institutions, the Nebraska College, also a courthouse, two public halls, twelve churches, several national banks and two high schools, several flour-mills, a foundry, machine-shop, tannery, manufactories of cigars, beer, bricks, carriages, plows, soap, etc. Several newspapers are published here. The city is lighted with gas. Population, 11,494.

NEBUCHADNEZZAR is the familiar form of the name of the great Babylonian king who carried the Jews captive, and whose reign marks the highest point of the Chaldean empire. To what has been said of Nebuchadnezzar in the article BABYLONIA (comp. DANIEL and ISRAEL) it may be added that a fragment of a cylinder with an inscription relating to a war with Egypt in the thirty-seventh year of his reign has been published by Schrader, that an inscription of Nebuchadnezzar has been observed by Sayce on the north bank of Nahr al-Kalb near Beyrút, and that two large inscriptions have also been found by Pognon in Wádi Brissa, near Hermel, in the Lebanon.

NEBULA. See ASTRONOMY.

NEBULAR THEORY. The nebular theory is a famous hypothesis which has been advanced with the view of accounting for the origin of the solar system. It is emphatically a speculation; it cannot be demonstrated by observation or established by mathematical calculation.

There are very remarkable features in the solar system which point unmistakably to some common origin of many of the different bodies which it contains. We must at once put the comets out of view. It does not appear that they bear any testimony on either side of the question. But even with this omission we still muster in the solar system from two to three hundred bodies, almost every one of which pronounces distinctly, though with varying emphasis, in favor of the nebular theory. The first great fact to which we refer is the common direction in which the planets revolve around the sun. If the direction of movement were merely decided by chance, the probability against such an arrangement is of stupendous magnitude. It is represented by the ratio of unity to a number containing about sixty figures, and so we are at once forced to the conclusion that this remarkable feature of the planetary motions must have some physical explanation. In a minor degree this conclusion is strengthened by observing the satellites. Discarding those of Uranus, in which the orbits of the satellites are highly inclined to the ecliptic, and in which manifestly some exceptional though unknown influences have been at work, we may say that the satellites revolve around the primaries also in the same direction; while, to make the picture complete, we find that the planets, so far as they can be observed, rotate on their axes in the same manner.

The nebular theory here steps in and offers an explanation of this most remarkable uniformity. Laplace supposed that our sun had once a stupendous nebulous atmosphere which extended so far out as to fill all the space at present occupied by the planets. This gigantic nebulous mass, of which the sun was only the central and somewhat more condensed portion, is supposed to have had a movement of rotation on its axis. There is no difficulty in conceiving how a nebula, quite independently of any internal motion of its parts, shall also have had as a whole a movement of rotation. In fact a little consideration will show from the law of probabilities that it is infinitely probable that such an object should really have *some* movement of rotation, no matter by what cause the nebula may have originated. As this vast mass cooled it must by the laws of heat have con-

tracted toward the center, and as it contracted it must, according to a well-known law of dynamics, rotate more rapidly. The time would then come when the centrifugal force on the outer parts of the mass would more than counterbalance the attraction of the center, and thus we would have the outer parts left as a ring. The inner portion would still continue to contract, the same process would be repeated, and thus a second ring would be formed. We have thus grounds for believing that the original nebula would separate into a series of rings all revolving in the same direction with a central nebulous mass in the interior. The materials of each ring would continue to cool and to contract until they passed from the gaseous to the liquid condition. If the consolidation took place with comparative uniformity we might then anticipate the formation of a vast multitude of small planets such as those we actually do find in the region between the orbit of Mars and that of Jupiter. More usually, however, the ring might be expected not to be uniform, and therefore to condense in some parts more rapidly than in others. The effect of such contraction would be to draw into a single mass the materials of the ring, and thus we would have a planet formed, while the satellites of that planet would be developed from the still nascent planet in the same way as the planet itself originated from the sun. In this way we account most simply for the uniformity in the direction in which the planets revolve, and for the mutual proximity of the planes in which their orbits are contained. The rotation of the planets on their axes is also explained, for at the time of the first formation of the planet it must have participated in the rotation of the whole nebula, and by the subsequent contraction of the planet the speed with which the rotation was performed must have been accelerated.

NECHO, the Biblical form (2 Kings xxiii. 29; Jer. xlvi. 2) of the name Neku. (See EGYPT and ISRAEL.)

NECKER, JACQUES, finance minister of Louis XVI., and convener of the states-general of 1789, was born at Geneva in 1732. He became a syndic or director of the French East India Company, and, after showing his financial ability in its management, defended it in an able memoir against the attacks of Morellet in 1769. He had also made interest with the French Government by lending it money, and in October, 1776, was made finance minister of France. He did great good in regulating the finances by attempting to divide the *taille* or poll-tax more equally, by abolishing the "*vingtième d'industrie*," and establishing "*monts du piété*." In 1781 he published his famous *Compte Rendu*, in which he drew the balance-sheet of France, and was dismissed from his office. In 1788 the country, which had come to believe that Necker was the only minister who could "stop the deficit," as they said, demanded Necker's recall, and in September, 1788, he became once more director-general of the finances. Throughout the early months of 1789 Necker was regarded as the savior of France. He was nevertheless regarded as the cause of the Revolution by the court, and on July 11th, while at dinner, received the abrupt order to leave France at once. But Necker's dismissal brought about the taking of the Bastille, which induced the king to recall his old minister. His return was an absolute ovation. His popularity vanished when his only idea was to ask the assembly for new loans, and in September, 1790, he resigned his office, unregretted by a single Frenchman. Not without difficulty he reached Coppet, near Geneva, an estate he had bought in 1784. Here he occupied himself with literature. He died at Coppet in April, 1804.

NECROSIS. This word, which has the same meaning as mortification, is now restricted in surgical works

to death of bone. It is sometimes used to signify the part which dies; it may, however, with more propriety signify the process, ending in the death of the bone. A severe inflammation, caused by a severe blow, by cold, or by the absorption of various poisons, as mercury and phosphorus, is the general precursor of necrosis.

NECTAR AND AMBROSIA are the nourishment of the gods in Homer and in Greek literature generally.

NECTARINE, a fruit differing from the peach in having a smooth or glabrous skin instead of a downy one. The varieties of nectarine, too, have often a distinct flavor from that of the peaches. The common origin of the peach and nectarine is shown, however, by the facts that seeds of the one will often reproduce the other, and that fruits of both kinds have not infrequently been met with on the same branch.

NEEDLE. The sewing needle is an implement which has been in use from prehistoric times in all places where mankind used the skins of animals or woven fabrics for clothing. Originally the needle was made of fishbone, bone, or ivory, and its first form was probably a rude eyeless bodkin. Needles of bone continue to this day to be used by uncivilized tribes; but since the time of the discovery of bronze metal needles have been in use in civilized communities. It is on record that needles of steel were made at Nuremberg toward the end of the fourteenth century, and at a later period Spanish needles acquired wide celebrity. For upward of two centuries the manufacture has been established in England—Redditch in Worcestershire, with several other small towns in Warwickshire, being the center of the industry, first planted there by Germans. Originally the trade was domestic in its character, but now it is carried on in large manufactories where mechanical appliances have to a certain extent supplanted handiwork, with much advantage to the health and the well-being of the operatives.

The raw material of the manufacture consists of steel wire of fine quality and suitable gauge. The wire is supplied in coils of definite weight and diameter, and the first operation consists in cutting the coil with powerful shears. With the aid of a gauge the coil is cut with precision into lengths, each sufficient for two needles. The lengths, having the curvature of the coil and other inequalities, are next straightened. For this purpose a bundle containing several thousand lengths is packed within two strong iron rings; the bundle is heated to red heat, and then pressed on an iron plate having two parallel grooves in which the iron rings run. Over this plate the bundle is worked backward and forward by the pressure of an oblong slightly-curved iron tool having two longitudinal slits through which the edges of the rings project. Thus by combined pressure and rolling the whole of the lengths quickly become perfectly straight and even. The next operation consists in pointing both ends of the wires, which, being done on a dry grindstone, revolving at high speed, is, from the sparks and dust created, very injurious to the operatives. A grinder, holding at one time several dozen wires against the stone with his left hand, and revolving them slightly with his right, will point about 100,000 needles in a day. He is but imperfectly protected against the deadly dust he produces by a cowl which, partly covering the grindstone, is connected with a pipe through which a strong current of air is drawn, sucking away a large proportion of the dust. For the operation of pointing various machines have come into extensive use, especially in Germany. In general principle these machines consist of a wheel, to the periphery of which the wires to be pointed are held by an india-rubber band. It revolves at right angles to the revolving hollow grindstone, and, bringing each wire in rapid succession at the

proper angle for grinding against the stone, it points three times as many as a skillful grinder. The succeeding series of operations have for their object the eyeing of the needles. As a preliminary to this the oxidized scale at the center of the wire is ground off, and on the surface so prepared each wire is separately stamped, by means of dies, with the grooved and rounded impression of two needle heads set end to end. Through these stamped heads the eyeholes are next perforated by means of a screw-press working a pair of fine steel punches or prongs. Each wire now forms two needles attached head to head by a broad thin scarf of steel at the point of junction where the metal has been stamped for the head. The double needles, taken to the number of about one hundred, are threaded together with a fine wire passed through the eyes, giving the whole the appearance of a fine close-set comb. Each side is clamped up tightly, and the expansion of the scarf in the center is removed by a file. The spitted row is now ready to break over into separate needles, and as the point of junction of the two sets of heads is weakened by the stamping process, the rows readily break at that point by bending. These heads are then smoothed and rounded with the file before the clamp is removed, the wire withdrawn, and the separate needles set free. At this stage the needles are hardened and tempered in the usual manner; that is, they are placed in an iron tray, heated to redness in a muffle furnace, plunged into an oil bath, then re-heated in the muffle till they assume a straw color, and gradually cooled. Following the tempering comes the process of scouring and fining or polishing, for which purpose the needles are put up in bundles of several thousands mixed with soft soap, oil, and emery powder, and tied tightly round with a canvas cover. A number of such bundles are laid in the bed of a machine in which by rollers or other devices they are kept rolling backward and forward, so that each individual needle rubs against its neighbors. After sufficient time the bundles are withdrawn, the needles cleaned by washing, dried, and again bundled up as before, but with a mixture containing putty powder in place of emery. The rolling process is continued till the needles acquire a sufficiently polished surface. The needles are now unpacked, washed in an alkaline solution, and dried in sawdust. From that they are conveyed to trays, where they are brought parallel to each other by a sharp jerking motion. It is next necessary to bring all the heads in one direction, which is dexterously done by a "header," who with a cloth finger-stool on the fourth finger presses a lot of needles against that cloth. Points presented adhere, and thus at each operation a number of needles remain sticking in the finger-stool. While this arrangement is going on, faulty and imperfect needles are picked out. The heads being all now laid in one direction, attention is given to the smoothing and rounding of the eyeholes, a work essential for the prevention of the fraying and breaking of the thread in sewing. The heads are blued by heating, an operation most neatly and perfectly performed by bringing each head in succession in contact with a gas flame by means of a revolving wheel, against the periphery of which the needles are retained by an elastic band. The needles so glued are strung on a roughened steel wire, over which is spread a fine paste of oil and emery. These wires are suspended between uprights on a frame platform, to which a jerking motion is communicated; thereby an oscillating motion is communicated to the suspended needles, and the gentle friction thus set up between the needle eye and the roughened wire and emery slowly but effectually secures the desired effect. Now it only remains to free the head from the blue color on a small grindstone, and

give a final polish to the needle on a rapidly revolving buff wheel aided by putty powder. It has of late become a common practice to gild the heads of needles. The variety of needles manufactured for sewing by hand and machine, for packing, for upholstery and leather work, as well as for surgical purposes, is very great, and demands many modifications of processes and appliances.

NEER, VAN DER. Aernout and Eglon van der Neer, father and son, were painters in the seventeenth century.

NEENAH, a city of Winnebago county, Wis., is situated on the Fox river, thirty miles north of Fond du Lac, with which it has steamboat connection. The water power is used to operate flouring and paper mills. Neenah has also many sawmills, manufactories of sash, door and blinds, staves, etc., and a population of 6,000.

NEES VON ESENBECK, CHRISTIAN GOTTFRIED, botanist and entomologist, was born at Erbach on February 14, 1776. He died in 1858.

NEGAPATAM, a town and the chief port of Tanjore district, Madras, India.

NEGAUNEE, a town in Michigan, in Marquette county, lies at the junction of the Marquette, Houghton and Ontonagan railroad, with the Chicago and North-Western. It is in the midst of a rich iron country, and very large capitals here invested in iron mines. The town has several large blast furnaces, national banks, newspaper offices, three churches, manufactories of mining powder and other explosives. Population in 1890, 6,061.

NEGLIGENCE is in one aspect the correlative of diligence (see DILIGENCE), in another of intention. It is the absence of diligence or the absence of intention. All definitions imply this. Negligence is a term difficult to define for more than one reason. It is used not only to denote a mental state, but the consequences resulting from a mental state. Again, the term bears a somewhat different meaning as applied to civil or criminal liability. The meaning of negligence, in the common use of language, is very general and indefinite. It is practically synonymous with heedlessness or carelessness, not taking notice of matters relevant to the business in hand, of which notice might and ought to have been taken. This meaning is no doubt included in the legal sense of the word, but in reference to criminal law the word has also the wider meaning of omitting, for whatever reason, to discharge a legal duty, *e.g.*, the omission by a medical man to exercise that skill which it is his duty to exercise. The vagueness of the standard by which negligence is tested is another and more serious practical difficulty. The standard is the average prudent action of the average citizen, and the defendant fails to reach this standard at his peril. This is the standard implied by such definitions as that of the New York Penal Code, "the terms 'neglect,' 'negligence,' 'negligent,' and 'negligently' * * * import a want of such attention to the nature or probable consequences of the act or omission as a prudent man ordinarily bestows in acting in his own concerns," and that of Sirey (*Code Pénal*, § 319), "the omission or forgetfulness of a precaution dictated by prudence." The connection between negligence and intention is illustrated by a passage in the judgment of Baron Alderson in *Blyth v. The Birmingham Water Works Company* (1856). "The definition of negligence," says that learned judge, "is the omitting to do something that a reasonable man would do, or the doing something that a reasonable man would not do; and an action may be brought if thereby mischief is caused to a third party not intentionally." The intention is of great importance in criminal law. Thus as a general rule it may

be said that what is manslaughter where there is negligence becomes murder where there is intention. But the negligence may in some cases be of such a nature as to lead to the presumption of legal malice. In the same way in cases where the liability is civil it is important to notice that the phenomena of negligence often accord closely with those of intention. The phenomena of negligence and of dishonest intention may be similar to such an extent that the court may regard them as the same, since the legal consequences resulting from them are the same.

NEGRO (Spanish and Italian *Negro*, from Latin *Niger*, black) in anthropology designates the distinctly dark as opposed to the fair, yellow, and brown varieties of mankind. In this its widest sense it embraces all the dark races, whose original home are the inter-tropical and sub-tropical regions of the eastern hemisphere, stretching roughly from Senegambia, West Africa, to the Fiji Archipelago, Pacific Ocean, west and east, and lying north and south between the extreme parallels of the Philippines and Tasmania. The Negro domain thus originally comprised all Africa south of the Sahara, India south of the Indo-Gangetic plains, Malaysia, and the greater part of Australasia. But this domain has since prehistoric times been intruded upon in the east mainly by peoples of the yellow Mongoloid, in the west mainly by peoples of the fair Caucasian stock. During the early and middle Tertiary epochs it appears also to have been gradually broken into two great divisions—by the subsidence of lands, some suppose, which are now flooded by the waters of the Indian Ocean, and to which Sclater has given the name of Lemuria. To these two great eastern and western geographical divisions now correspond the two great ethnical divisions of the Negro stock—the Papuan or Melanesian of Malaysia and Australasia, and the Negro proper of the African mainland. During the long ages that have elapsed since this separation, the two branches, if originally one, have had time under diverse outward conditions to become differentiated into two sufficiently marked physical types, so that on strictly anthropological as well as geographical grounds it becomes convenient to deal separately with the Papuan and African divisions of the Negro family.

Owing to their peculiar qualities, great muscular development, and power of endurance in hot and moist lands, combined with a remarkable absence of personal self-respect, the African populations have from the remotest times supplied a chief material to the slave markets of the Old and New World. For thousands of years an incessant stream of black blood has been directed from the interior to the east coast and thence to Madagascar, Arabia, Persia, and even India, or down the Nile to Egypt and Asia Minor, or across the Sahara, to the Barbary States. Since the discovery of America hundreds of thousands have in the same way been shipped from the west coast for the West Indies, New Spain, the British and French plantations, and Brazil. Speaking generally, this black element has not amalgamated with the population of the eastern hemisphere, and has consequently left few traces of its presence anywhere except in Madagascar, where there may possibly have been an indigenous Negro people before the arrival of the intruding Hovas and other Malay tribes. Nevertheless a strain of Negro blood is apparent, not only among the Tuaregs and especially the Tibus of the Sahara, but also in Morocco, South Algeria, Egypt, the low-lying Tehema of the West Arabian seaboard, Makran, and even here and there along the coast of Malabar and Ceylon.

In some parts of America, notably the West Indian islands, the colored has actually replaced the indigenous

and largely absorbed the white element. Here we are altogether on firmer ground, and fairly accurate returns enable us to form an approximate estimate of the proportion of full-blood and half-caste Negroes in almost every part of the New World. On the other hand, the nomenclature of these mongrels has become so perplexing, and is often applied so irregularly, that it has led to many misconceptions on this point. Thus the term "Creole," applicable in Mexico only to persons of pure Spanish descent, denotes in Brazil, Peru, and elsewhere the presence of black blood in varying proportions. Of this bewildering nomenclature the chief terms are as under:—

Negro, African, Black: Full-blood Negro, whether born in Africa or of African descent.

Mulatto: Issue of black and white parents either way—a constant term in America.

Mestizo: Any half-breed, whether of white and Negro parents, or (more commonly in Spanish America) of white and Indian parents.

Creole: Mostly white of pure descent, but also blacks of pure descent (Brazil), the issue of whites and Mestizoes (Peru), and Mestizoes generally (Alaska). (In Louisiana and contiguous sections, the term Creole denotes a descendant of the original French or Spanish settlers.)

Zambo: Any half-breed, but mostly the issue of Negro and Indian parents; in the United States, Peru, and West Indies of Negro and Mulatto; in St. Vincent the half-caste Caribs.

Zambo Preto: Issue of Negro father and Zamba mother (Mexico and elsewhere).

Cholo: Issue of Zamboes (South America).

Pardo: Synonymous with Mulatto (Brazil); any Mestizo (Argentine States).

Mamaluco: Any Mestizo, but especially the issue of whites and Indians (Brazil).

Chino: Negro and Indian half-caste (Mexico, and generally in Spanish America).

Casco: Direct issue of *Mamalucoes* on both sides (South America).

Tente en el Ayre: Mongrels in whom the white element predominates (South America).

Cafuso: Issue of Negro and Indian, dark shade and woolly hair predominating (Brazil).

Caburet: Issue of Negress and Indian (Brazil).

Cariboco, Tapanhuna, Xibaro: Local Brazilian terms of Tupi origin applied to various crosses between the Negroes and Indians.

The term *Mulatto* is applied to the offsprings of parents, one of whom is pure *Caucasian* and the other pure *African*; *Quadroons*, issue of *Mulatto* and white parents; *Octoroon*, the issue of *Quadroon* and white parents. The above is the nomenclature applied to mongrels in the United States.

NEGROPONT. See EUBŒA.

NEHEMIAH, governor of Judæa under Artaxerxes Longimanus. (See ISRAEL.) The book of Nehemiah is really part of the same work with the book of EZRA (*q.v.*), though it embodies certain memoirs of Nehemiah in which he writes in the first person. Apart from what is related in this book, we possess no trustworthy information about Nehemiah.

NEISSE, a well-built town and fortress of the first rank in the district of Oppeln, Prussian Silesia, lies at the junction of the Neisse and the Biela, and consists of the town proper on the right bank of the former river and the Friedrichstadt on the left. In 1880 the town contained 20,507 inhabitants, of whom 15,825 were Roman Catholics. The garrison forms about a fourth of the population.

NELEUS, a hero of Greek mythology, was son of

Poseidon by Tyro, daughter of Salmoneus, to whom the god appeared under the form of the Thessalian river-god Enipeus. Born in Thessaly, where his brother Pelias is king of Iolcus, Neleus becomes king of Pylus in Messenia and the ancestor of a royal family called the Neleidæ, who are historically traceable as the old ruling family in some of the Ionic states in Asia Minor. Tradition uniformly derives the Ionic colonies from the Attic coast, and the presence of the Neleidæ is explained by the legend that when the Dorians conquered the Peloponnesus the Neleidæ were driven out and took refuge in Attica, where they at once became kings of the land, and led colonies to the eastern shores of the Ægean. This race was obviously a maritime one, for there is no path except the sea between the widely separate shores where it can be traced, and its divine ancestor is Poseidon. Neleus was father by Chloris of Nestor, Pero, and other children. Through the contest for the hand of Pero he is connected with the legends of the prophetic race of the Melampodidæ, who founded the mysteries and expiatory rites and the orgies of Bacchus in Argolis.

NELLORE, a district in Madras presidency, India, with an area of 8,739 square miles. The population of Nellore in 1881 was 1,220,236, including 1,138,031 Hindus and 61,344 Mohammedans.

NELSON, a seaport of New Zealand, capital of a provincial district of the same name, prettily situated on the shores of a small harbor at the bottom of Blind Bay, on the northern coast of the South Island. It is a diocesan city, and contains several churches and a college. The climate is healthy, and the surrounding scenery very picturesque.

NELSON, HORATIO NELSON, VISCOUNT, was 7 younger son of the Rev. Edmund Nelson, and was born at Barnham, Thorpe, Norfolk, September 29, 1758. A love of adventure and a daring spirit, which developed itself from his earliest years, inclined the future admiral to the life of the sea, and, through the interest of a maternal uncle, the lad entered the navy in 1770. He was made a post-captain at the age of twenty-one, a promotion due to merit alone, and remarkable in that aristocratic age; and during the next few years he was actively engaged in the vicissitudes of the American War.

War between England and revolutionary France was declared in the first months of 1793; and Nelson, on the recommendation of Lord Hood—a veteran who held him in high esteem—was made captain of the *Agamemnon*, the first ship of the line commanded by him. He was dispatched under Hood to the Mediterranean; he took a prominent part in the siege of Bastia; and the capitulation of the place was due, for the most part, to their determined valor. At the siege of Cadiz also, where he lost an eye, he contributed largely to the result. In March, 1795, the British fleet under Admiral Hotham—Lord Hood had by this time been replaced—was partially engaged off the coasts of Italy with a French fleet of superior force; and a French eighty-four, having been dismasted, sheered off, towed by a powerful frigate, and supported by two large ships of the line. The *Agamemnon*, though only a sixty-four, stood out boldly after the retiring enemy; and Nelson's maneuvers were so skillful that he all but destroyed the crippled Frenchman, and kept the whole hostile squadron at bay, without incurring any serious loss. The injured ship, with one of her consorts, was easily captured a few hours afterward; and, had the admiral followed Nelson's advice, the whole French fleet would have been brought to action, and have probably met a complete defeat.

In the winter of 1795-96 Nelson was employed in

cutting off the supplies of the French army on the Italian seaboard. Soon after this he became a commodore; and before long he had again performed one of those great feats of daring and skill which ordinary commanders would have deemed impossible. Spain, drawn into her old alliance with France, had declared war in 1796; and on February 13, 1797, a Spanish fleet met one of the English, a few miles off Cape St. Vincent. Though the enemy had twenty-seven ships of the line, and the British force was only fifteen, its admiral, Jervis, did not hesitate; and, skillfully employing a well-known maneuver, he broke the hostile line, cutting off nine ships. The Spanish admiral, however, endeavored to rejoin this detachment by wheeling around his van; and the evolution might have been successful had not Nelson, placed at the British rear, immediately abandoned his own line, and, disregarding his superior's orders, assailed with his single ship the advancing squadron. This audacious movement threw him in the way of three first and three second rates; and, though the *Captain* was ably seconded by the three nearest ships of the British line, Nelson was engaged for more than half an hour with a force immeasurably superior to his own. Yet British discipline and valor triumphed; the Spanish commander drew off beaten, and the *Captain* boarded and took two ships, each larger and more powerful than herself, Nelson leading his exulting crew in person to the cry of "Westminster Abbey or Victory." For this extraordinary passage of arms Nelson received the order of the Bath and was made an admiral—his splendid success and skillful promptitude having effaced, even in professional minds, his disregard of the rules of the service. During the following months he was engaged in operations against Spain and her colonies; and he lost an arm in an attack on Santa Cruz, a place famous for one of Blake's victories. The time had now arrived when his genius and skill were to appear in full force in an independent command. In May, 1798, he was dispatched by Jervis—now Lord St. Vincent—to intercept a great French armament, which, under the guidance of Bonaparte, was intended to reach Egypt and to threaten India. His squadron, however, having been crippled in a gale, the hostile fleet escaped from Toulon and reached Alexandria on July 1st, the British admiral, who had made Aboukir on June 28th, having just missed it. This misadventure deceived Nelson, who believed that the enemy was still at sea; and it was not until he had made a circuit by Crete to the coasts of Sicily, and back again to the shores of Greece, that he heard how the French had made good their landing. He set off from the Gulf of Coron, though his intelligence was a rumor only; and on August 1st the enemy was descried. His plan of attack was quickly formed, and it was marked by his wonted insight and skill. The French fleet lay in front of the roads of Aboukir, the rear supported by coast batteries, the center and van more out at sea, but composed of new and formidable ships; and, as shoals stretched between it and the neighboring shore, its admiral, Brueys, believed that no foe would thread the way between and attack from that side. Nelson, however, a dexterous pilot from boyhood, saw that with fine steering the feat was possible; and he directed part of his fleet to assail the enemy to the landward through this intricate passage, while the remaining part assailed from the seaward. As evening fell his preparations were complete; the shoal stopped only one of the British ships, and before an hour had passed his divided line had encompassed more than half the French fleet. The issue of the battle was never doubtful; the French, indeed, fought with heroic courage, but their rear and center, placed between two fires,

were gradually overpowered and destroyed; and their van, at anchor, like all their line, was either unable or perhaps unwilling to make sail and assist their consorts. The flagship of Brueys, the huge *Orient*, blew up toward midnight in a volcano of flame, and by daybreak on the 2d the victory was complete.

The victory of Marengo, won by Bonaparte after his extraordinary return from Egypt, having broken up the coalition against France, and inclined the czar to a French alliance, the Northern courts, with Denmark at their head, renewed the armed neutrality of 1780; and, in the first months of 1801, a British fleet was fitted out for the Baltic to put an end to this menacing league. Sir Peter Parker, a cautious veteran, was made chief of this expedition, Nelson being only the second in command. Copenhagen was covered by strong batteries; and an imposing array of heavily armed craft, protected by a shoal as was the case at Aboukir, presented a most formidable line of defense. Nelson, however, declared for an immediate attack; and on May 2d, the attempt was made, Parker having judiciously left him to act for himself. The result was that, although his squadron destroyed the first line of the Danish defenses, and threatened the capital with ruinous injury, the hostile batteries were not silenced, and Nelson's ships had suffered so much that he readily welcomed the terms of a truce which extricated him from no little danger. Parker, indeed, had been so alarmed at the prospect that he had actually signaled the fleet to retreat; but Nelson characteristically refused to obey until something like victory had been attained—on the whole, certainly, a wise resolve.

Nelson was made a viscount for Copenhagen, and the league of the North was soon dissolved, for, though his success had not been perfect, it had taught the enemy a severe lesson. During the summer of 1801 he was engaged in watching the first preparations for a descent on the English coast, already contemplated by Napoleon; and on the renewal of the war in 1803 Nelson was appointed to the Mediterranean command. He took up his station off Toulon; and for nearly two years he kept the French in port. At last at the end of March, 1805, the French admiral, Villeneuve, escaped from Toulon—his mission being to rally a Spanish squadron, to cross the Atlantic and reach the West Indies, and then, returning to the seas of Europe, to liberate the French and Spanish squadrons blockaded at Ferrol, Rochefort, and Brest, and to attain the Channel with a great armada of from fifty to sixty ships of the line.

By October 20th Villeneuve had put to sea with the combined fleets of France and Spain. Nelson, eager to decoy the Frenchman out, had kept a considerable distance from land. By daybreak on the 21st the fleet of Villeneuve was descried off the Cape of Trafalgar; and the English fleet was formed into two columns, the northern led by Nelson in the *Victory*, the southern under Collingwood in the *Royal Sovereign*. Villeneuve, a skillful seaman though a timid leader, had arranged his squadrons ably to meet the attack.

Six or seven ships of the French and Spanish first line made a stern and noble resistance; but the second line gradually fell to leeward; the van, as at the Nile, scarcely fired a shot; and, divided, scattered, and overpowered at every point where the defense was maintained, the allied fleet ere long was a mass of fragments, disabled, helpless, and pursued by their conquerors. Nevertheless the victory, splendid as it was, was dearly bought by the loss of the life of the illustrious warrior who had prepared it. A musket ball from the *Redoubtable's* tops inflicted a mortal wound on Nelson about an hour after the battle began, and he died toward evening, to the unspeakable grief of all who

witnessed the sorrowful scene in the *Victory*. He retained, however, his great faculties to the last; he lived to hear that almost two-thirds of the enemy's fleet had been destroyed or captured; and, though he passed away in the prime of manhood, it can hardly be said that his death was premature, for the foes of England had been swept from the ocean.

NELSONVILLE, a post-village in Athens county, Ohio, lies on the Hocking river, sixty-two miles south-east of Columbus. Coal-mining is the principal business of the place. It contains a bank, three churches, newspaper offices, has railroad and telegraph connections, and a population in 1890 of 5,000.

NEMATOIDEA. The name *Nematoidea* was first introduced by Rudolphi, but the group had been previously recognized as distinct by Zeder under the name of *Ascarides*. They are now by many systematists united with the *Acanthocephali* to form the order *Nemathelminthes*.

The *Nematoidea* possess an elongated and thread-like form varying in length from a few lines up to several feet. The body is covered externally by a chitinous cuticle which is a product of the subjacent epidermic layer; this cuticle is frequently prolonged into spines and papillæ, which are especially developed at the anterior end of the body. The mouth opens at the one extremity of the body and the anus at or near the other. Beneath the epidermis is a longitudinal layer of muscle-fibers which are separated into four distinct groups by the dorsal, ventral, and lateral areas; these are occupied by a continuation of the epidermic layer; in the lateral areas run two thin-walled tubes with clear contents, which unite in the anterior part of the body and open by a pore situated on the ventral area. These vessels are considered to represent the segmental organs of other worms. The lateral areas are entirely absent in *Gordius*. The body cavity is largely occupied by connective tissue, and neither here nor elsewhere are cilia found at any period of development. The alimentary tract consists of a straight tube running from the mouth to the anus without any convolutions; it is separable into three divisions—(1) a muscular œsophagus, which is often provided with cuticular teeth; (2) a cellular intestine; and (3) a short terminal rectum surrounded by muscular fibers.

NEMEAN GAMES. See GAMES.

NEMERTINES, or NEMERTEANS (*Nemertea*), is the name of a subdivision of worms, characterized by the ciliation of the skin, by the presence of a retractile proboscis, by the simple arrangement of the generative apparatus, and in certain cases by a peculiar pelagic larval stage to which the name "pilidium" has been given. Many of them are long thread-shaped or ribbon-shaped animals, more or less cylindrical in transverse section. Even the comparatively shortest species and genera can always be termed elongate, the broadest and shortest of all being the parasitic *Malacobdella* and the pelagic *Pelagonemertes*. There are no exterior appendages of any kind. The colors are often very bright and varied. They live in the sea, some being common among the corals and algæ, others hiding in the muddy or sandy bottom, and secreting gelatinous tubes which ensheath the body along its whole length.

NEMESIANUS, a Roman poet who flourished about 283 A.D. His full name was Marcus Aurelius Nemesianus Olympius, and he is called a Carthaginian. He was an admired and popular poet at the court of the Roman emperor Caius.

NEMESIS occasionally appears as a Greek goddess. At Rhamnus in Attica she had a famous temple, and there was an Attic legend that Helen was the daughter of Nemesis. The Attic goddess was perhaps a form of

Aphrodite, who sometimes bears the epithet Nemesis. In Smyrna and the neighboring Temnos we find a pair of goddesses of the name.

NEMESIUS, a Christian philosopher, author of a treatise *On Human Nature*, was, according to the title of his book, bishop of Emesa (in Syria); of his life nothing further is known, and even his date is uncertain, but most probably he flourished toward the close of the fourth century.

NENAGH, a market and assize town of County Tipperary, province of Munster, Ireland, is finely situated in a rich though hilly country near the river Nenagh, twenty-nine miles north of Tipperary and ninety-five southwest of Dublin.

NENNIUS, the supposed author of a *Historia Britonum*, which, commencing with a description of Britain, gives the mythical origin of the Britons and Scots and an account of the Roman occupation and of the reign of Vortigern, describes the successive settlements of the Saxons, and concludes with a narrative of the twelve battles in which King Arthur, in the sixth century, is said to have defeated the Saxons. The work is evidently the production of a Cymric or ancient Welsh writer.

NEOPHYTE was the designation applied to newly baptized persons in the ancient church.

NEOPLATONISM. *Historical Position and Significance*.—The political history of the ancient world closes with the formation, under Diocletian and Constantine, of a universal state bearing the cast of Oriental as well as Græco-Roman civilization. The history of ancient philosophy ends in like manner with a universal philosophy which appropriated elements of almost all the earlier systems, and worked up the results of Eastern and Western culture. And, just as the Byzantine Roman empire was at once the supreme effort of the old world and the outcome of its exhaustion, so Neoplatonism is in one aspect the consummation, in another the collapse, of ancient philosophy. Judged from the standpoint of pure science, or the empirical investigation of the universe, philosophy passed its meridian in Plato and Aristotle, declined in the post-Aristotelian systems, and set in the darkness of Neoplatonism. But, from the religious and moral point of view, it must be affirmed that the ethical "mood" which Neoplatonism endeavored to create and maintain is the highest and purest ever reached by antiquity.

It is a proof of the strength of the moral instincts of mankind that the only phase of culture which we can survey in all its stages from beginning to end culminated, not in materialism, but in the boldest idealism. This idealism, however, is also in its way a mark of intellectual bankruptcy. Contempt for reason and science leads in the end to barbarism—its necessary consequence being the rudest superstition, and sheer helplessness in the presence of all sorts of delusion. As a matter of fact, barbarism did break out after the flower had fallen from Neoplatonism. By a fortunate coincidence, at the very moment when this bankruptcy of the old culture—its reversion to barbarism—must have become apparent, the stage of history was occupied by barbaric peoples, with whom the work of the past thousand years went for nothing. This has obscured the fact, which is nevertheless obvious enough to a keener scrutiny, that the inner history of antiquity, ending as it did in despair of this world, must in any event have seen a recurrence of barbarism. The present world was a thing that men would neither enjoy, nor master, nor study. A new world was discovered, for the sake of which everything else was abandoned; to make sure of that world insight and intelligence were freely sacrificed; and in the light that streamed from

beyond, the absurdities of the present became wisdom, and its wisdom became foolishness.

Such is Neoplatonism. The pre-Socratic philosophy took its stand on natural science, to the exclusion of ethics and religion. The systems of Plato and Aristotle sought to adjust the rival claims of physics and ethics (although the supremacy of the latter was already acknowledged); but the popular religions were thrown overboard. The post-Aristotelian philosophy in all its branches makes withdrawal from the objective world its starting point. It might seem, indeed, that Stoicism indicates a falling off from Plato and Aristotle toward materialism, but the ethical dualism, which was the ruling tendency of the Stoa, could not long endure its materialistic physics, and took refuge in the metaphysical dualism of the Platonists. But this originated no permanent philosophical creation. From one-sided Platonism issued the various forms of skepticism, the attempt to undermine the trustworthiness of empirical knowledge. Neoplatonism, coming last, has borrowed something from all the schools. First, it stands in the line of post-Aristotelian systems; it is, in fact, as a subjective philosophy, their logical completion. Secondly, it is founded on skepticism; for it has neither interest in, nor reliance upon, empirical knowledge. Thirdly, it can justly claim the honor of Plato's name, since it expressly goes back to him for its metaphysics, directly combating with those of Stoa. Yet even on this point it has learned something from the Stoics; the Neoplatonic conception of the action of the Deity on the world and of the essence and origin of matter can only be explained by reference to the dynamic pantheism of the Stoa. Fourthly, the study of Aristotle also exercised an influence on Neoplatonism. This appears, not only in its philosophical method, but also—though less prominently—in its metaphysic. And, fifthly, Neoplatonism adopted the ethics of Stoicism; although it was found necessary to supplement them by a still higher conception of the functions of the spirit.

NEOPTOLEMUS was the son of Achilles and Deidamia, one of the daughters of Lycomedes of Scyros, at whose court Achilles was concealed by his mother in female attire to keep him away from the Trojan War. He was brought to Troy in the last year of the war by Ulysses, whom he helped in persuading Philoctetes to come from Lemnos to aid the Greeks, and he was one of the warriors in the wooden horse. It was he who killed Priam during the sack of the city.

NEPAL, NEPAUL, or NIPAL, is a small independent state, situated on the northeastern frontier of Hindustan. Its extreme length is about 525 miles, and in breadth it varies from 90 to 140 miles. Its population is estimated by the natives at about 5,000,000.

NEPHRITE. See JADE.

NEPOMUK, ST. JOHN OF. See JOHN.

NEPOS, CORNELIUS, a Roman historian, friend of Catullus, Cicero, and Pomponius Atticus, was probably a native of Verona. Nothing is known of his life, but he is recorded to have written a universal history under the title *Chronica* letters to Cicero, and other works, especially a series of biographies styled *De Viris Illustribus*.

NEPOS, JULIUS. The last but one of the emperors of the West, from 474 to 475, was a nephew of that Marcellinus who in the latter half of the fifth century had established a semi-independent principality in Dalmatia. After the death of Olybrius, on October 23, 472, the throne of the West remained for some months vacant, during which Italy was abandoned to lawless barbarians. On March 5, 473, the army, at the instigation of Gundobald the Burgundian, who had succeeded to the power and authority of his uncle

Ricimer, raised Glycerius, an obscure officer, to the imperial dignity. Meanwhile Leo I., emperor of the East, was discussing with his council the election of a new colleague for the Western empire. At length choice was made of Nepos, who married a niece of the empress Verina.

NEPTUNE, the Roman god of the sea, is probably adopted from Greek religion. The earliest reference to his worship is on the occasion when the Sibylline books included him among the gods to whom the first lectisternium was dedicated, 399 B.C. In the poets no trait of Neptune occurs that is not directly borrowed from the Greek Poseidon. His festival, Neptunalia, was celebrated on July 23, and his temple stood near the Circus Flaminius.

NÉRAC, a town of France, formerly the capital of the duchy of Albret, is situated in the department of Lot-et-Garonne, on both banks of the Bayse, a navigable tributary of the Garonne, sixteen miles west-southwest of Agen.

NERBUDDA (properly NARBADÁ), one of the great rivers of India, traditionally regarded as the boundary between Hindustan proper and the Deccan. It rises on the summit of Amarkantak hill, in Rewah state, and, after a westward course of 800 miles through the Central Provinces and Guzerat, falls into the sea in the Bombay district of Broach. During its passage through the Central Provinces several falls interrupt its course, the principal of which are a series of glittering cascades and rapids for some hundreds of feet down the heights of Amarkantak, and the well-known falls of the "Marble rocks" nine miles below Jabalpur.

NEREUS, the old man of the sea, was described in Greek legend as full of wisdom and knowledge, friendly to men, but requiring compulsion before he reveals to them all that he knows. The struggle in which Heracles wrestles and overcomes him is a favorite subject of early Greek art; Heracles, the representative of toiling, active man, bends to do his will even the power of the sea. The fifty daughters of Nereus, the Nereids, are personifications of the smiling, quiet sea with all the gifts which it offers to men.

NERI, PHILIP. Filippo Neri, one of the most remarkable and individual figures among the ecclesiastics of the sixteenth century, was born at Florence, July 21, 1515. In 1548 he founded the celebrated confraternity of the Santissima Trinità de' Pellegrini e de' Convalescenti, whose primary object is to minister to the needs of the thousands of poor pilgrims accustomed to flock to Rome, especially in years of jubilee, and also to relieve the patients discharged from hospitals, but still too weak for labor. In 1551 he passed through all the minor orders, and was ordained deacon, and finally priest on May 23d. He settled down, with some companions, at the hospital of San Girolamo della Carità, and while there tentatively began, in 1556, the institute with which his name is more especially connected, that of the Oratory, after a plan he had formed of proceeding as a missionary to India was abandoned at the instance of shrewd advisers, who saw that there was abundant work to be done in Rome, and that he was the man to do it.

The Florentines, however, built in 1574 a large oratory or mission-room for the society contiguous to San Giovanni, in order to save them the fatigue of the daily journey to and from San Girolamo, and to provide a more convenient place of assembly, and the headquarters were transferred thither. It was immediately after taking possession of their new quarters that Filippo Neri formally organized, under permission of a bull dated July 15, 1575, a community of secular priests, entitled the Congregation of the Oratory. Neri con-

tinued in the government of the Oratory until his death, which took place on May 26, 1595, in the eightieth year of his age. There are many anecdotes told of him which attest his possession of a playful humor, united with shrewd mother-wit, often urging him to acts with a ludicrous aspect, but which were well calculated to serve his purpose of divesting religion of the hyper-professional garb it wore in his day, and bringing it within the area of ordinary lay experience. This, rather than the atmosphere of supernaturalism with which he is surrounded in the various biographies of him which have appeared, and that to a much greater degree than is common in similar writings, is the true key to his popularity, and to the fact that his name figures often in the folk-lore of the Roman poor, whom he loved so well and served so long. He was beatified by Paul V. in 1600, and canonized by Gregory XV. in 1622.

NERO, Roman emperor, the only child of Cn. Domitius Ahenobarbus and the younger Agrippina, was born at Antium on December 15, 37 A.D., nine months after the death of the emperor Tiberius. His father Domitius, at best a violent, pleasure-seeking noble, died when Nero was scarcely three years old. In the previous year (39 A.D.) his mother had been banished by order of her brother the emperor Caligula on a charge of treasonable conspiracy, and Nero, thus early deprived of both parents, found a bare shelter in the house of his aunt Domitia, where two slaves, a barber and a dancer, commenced the training of the future emperor. With the death of Caligula in 41 A.D., his prospects improved, for Agrippina was recalled from exile by her uncle, the new emperor Claudius, and resumed the charge of her young son. Nero's history during the next thirteen years is summed up in the determined struggle carried on by his mother to win for him the throne which it had been predicted should be his. On December 15, 51, Nero completed his fourteenth year, and Agrippina (who had caused the execution of the empress Messolima, and had married her uncle the emperor), in view of Claudius' failing health, determined to delay no longer his adoption of the toga virilis. The occasion was celebrated in a manner which seemed to place Nero's prospects of succession beyond the reach of doubt. On October 13, 54, Claudius died, poisoned, as all our authorities declare, by the orders of his unscrupulous wife. For some hours the fact of his death was concealed, but at noon the gates of the palace were thrown open, and Nero was presented to the soldiers on guard as their new sovereign. From the steps of the palace he proceeded to the prætorian camp to receive the salutations of the troops, and thence to the senate-house, where he was fully and promptly invested with all the honors, titles, and powers of emperor.

During the first five years of his reign, the golden "quinquennium Neronis," little occurred to damp the hopes excited by his behavior on succeeding to the throne. His clemency of temper was unabated. His promises of constitutional moderation were amply fulfilled, and the senate found itself free to discuss and even to decide important administrative questions. Abuses were remedied, the provincials protected from oppression, and the burdens of taxation lightened. On the frontiers, thanks chiefly to Corbulo's energy and skill, no disaster occurred serious enough to shake the general confidence in the government, and even the murder of Britannicus seems to have been easily pardoned at the time as a necessary measure of self-defense. But Seneca's fears of what the consequences would be, should Nero's sleeping passions once be roused, were fully verified by the result, and he seems to have seen all along from what quarter danger was to

be apprehended. He now plunged into excesses of all kinds, the mention of some of which would be enough to bring a blush to the cheek of a savage; and among the crimes by his instigation committed, murder was a common incident, while the horrible atrocities of incest with and murder of his mother give to his name a preëminence among the moral monstrosities which the world has produced. No relation was sacred enough to shield the victim who had crossed the course of his passion or thwarted one of his bestial desires.

This series of crimes, in spite of the unvarying applause which still greeted all Nero's acts, had excited gloomy forebodings of coming evil, and the general uneasiness was increased by the events which followed. In 63 the partial destruction of Pompeii by an earthquake, and the news of the evacuation of Armenia by the Roman legions, seemed to confirm the belief that the blessing of the gods was no longer with the emperor. A far deeper and more lasting impression was produced by the great fire in Rome, an event which more than almost any other has thrown a lurid light around Nero's reign. The fire broke out on the night of July 18, 64, among the wooden booths at the south-east end of the Circus Maximus. Thence in one direction it rapidly spread over the Palatine and Velia up to the low cliffs of the Esquiline, and in another it laid waste the Aventine, the Forum Boarium, and Velabrum till it reached the Tiber and the solid barrier of the Servian wall. After burning fiercely for six days, and when its fury seemed to have exhausted itself, it suddenly started afresh in the northern quarter of the city, and desolated the two regions of the Circus Flaminius and the Via Lata. By the time that it was finally quenched only four of the fourteen regiones remained untouched; three had been utterly destroyed, and seven reduced to ruins. The conflagration is said by all authorities later than Tacitus to have been deliberately caused by Nero himself. But Tacitus, though he mentions rumors to that effect, declares that its origin was uncertain. Nero, however, undeterred by forebodings and rumors, proceeded with the congenial work of repairing the damage inflicted by the flames. In addition to the rebuilding of the streets, he gratified his love of magnificence by the erection of a splendid palace for himself. To defray the enormous cost, Italy and the provinces, says Tacitus, were ransacked, and in Asia and Achaia especially the rapacity of the imperial commissioners recalled the days of Mummius and of Sulla. It was the first occasion on which the provincials had suffered from Nero's rule, and the discontent it caused helped to weaken his hold over them at the very moment when the growing discontent in Rome was gathering to a head; for early in 65 Nero was panic-stricken amid his pleasures by the discovery of a formidable conspiracy against his life and rule.

The plan was that Nero should be murdered when he appeared as usual at the games in the circus, but the design was frustrated by the treachery of a freedman, Milichus, who, tempted by the hope of a large reward, disclosed the whole plot to the emperor. In a frenzy of sudden terror Nero struck right and left among the ranks of the conspirators. Piso was put to death in his own house; and his fall was rapidly followed by the execution of Fænius Rufus, Lucan, and many of their less prominent accomplices. Even Seneca himself, though there seems to have been no evidence of his complicity, could not escape the frantic suspiciousness of the emperor. For the moment Nero felt safe; but, though largesses and thanksgivings celebrated the suppression of the conspiracy, and the dazzling round of games and shows was renewed with even increased splendor, the effects of the shock were visible in the long and dreary

list of victims who during the next few months were sacrificed to his restless fears and savage resentment. Early, however, in the summer of 66, the visit of the Parthian prince Tiridates to Italy seemed to shed a ray of light over the increasing darkness of Nero's last years. He had long panted for an opportunity of displaying his varied artistic gifts before a worthier and more sympathetic audience than could be found in Rome. With this view he had already, in 64, appeared on the stage before the half-Greek public of Naples. But his mind was now set on challenging the applause of the Greeks themselves in the ancient home of art. Toward the end of 66 he arrived in Greece, accompanied by a motley following of soldiers, courtiers, musicians, and dancers, determined to forget for a time Rome and the irksome affairs of Rome with its conspiracies and intrigues.

But while Nero was reveling in Greece the dissatisfaction with his rule, and the fear and abhorrence excited by his crimes, were rapidly taking the shape of a resolute determination to get rid of him. That movements in this direction were on foot in Rome may be safely inferred from the urgency with which the imperial freedman Helius insisted upon Nero's return to Italy; but far more serious than any amount of intrigue in Rome was the disaffection which now showed itself in the rich and warlike provinces of the west. Meanwhile in Spain Galba had been saluted emperor by his legions, had accepted the title, and was already on his march toward Italy. Had Nero acted with energy he might still have checked the revolt. But he did nothing. He had reluctantly left Greece early in 68, but returned to Italy only to renew his revels. When, on March 19th, the news reached him at Naples of the rising in Gaul, he allowed a week to elapse before he could tear himself away from his pleasures. When he did at last reënter Rome, he contented himself with the empty form of proscribing Vindex, and setting a price on his head. In April the announcement that Spain also had revolted, and that the legions in Germany had declared for a republic, terrified him into something like energy. But it was too late. The news from the provinces fanned into flame the smoldering disaffection in Rome. During the next few weeks the senate almost openly intrigued against him, and the populace, once so lavish of their applause, were silent or hostile. Every day brought fresh instances of desertion, and the fidelity of the prætorian sentinels was more than doubtful. When finally even the palace guards forsook their posts, Nero despairingly stole out of Rome to seek shelter in a freedman's villa some four miles off. In this hiding-place he heard of the senate's proclamation of Galba as emperor, and of the sentence of death passed on himself. On the approach of the horsemen sent to drag him to execution, he collected sufficient courage to save himself by suicide from this final ignominy, and the soldiers arrived only to find the emperor in the agonies of death. Nero died on June 9, 68, in the thirty-first year of his age and the fourteenth of his reign, and his remains were deposited by the faithful hands of Acte in the family tomb of the Domitii on the Pincian Hill. With his death ended the line of the Cæsars, and Roman imperialism entered upon a new phase.

NERTCHINSK, a district town of eastern Siberia, situated in the government of Transbaikalia, 178 miles to the east of Tchita, on the left bank of the Nertcha, three miles from its junction with the Shilka.

NERTCHINSK (in full **NERTCHINSKIY ZAVOD**), a town and silver-mine situated in the government of Transbaikalia, 185 miles east-southeast of the Nertchinsk noticed above (with which it is very often confounded),

on the Algacha river, a few miles above its junction with the Argun.

NERTCHINSK MINING DISTRICT, an area of more than 2,700 square miles, extending for nearly 270 miles from north to south, and comprising all the silver-mines and gold-fields situated between the Shilka and the Argun, together with a few on the left bank of the Shilka. It is traversed by several parallel chains of mountains which run from southwest to northeast, having their base on the eastern Transbaikalian plateau, while their summits rise to about 4,500 feet. These are intersected by a complicated system of deep, narrow valleys, densely wooded, with a few expansions along the larger rivers, where the inhabitants with difficulty raise some rye and wheat. Several of the villages that have sprung up around the silver-mines are more populous than the district towns of eastern Siberia.

NERVA, Roman emperor, was called to the throne on the murder of Domitian (September 18, 96). Nerva must have been born in 32 A.D., for he was sixty-four years old at the time of his accession in 96 A.D.

Nerva seems to have followed the custom established by his predecessors of announcing at the outset the general lines of his future policy. Domitian had been arbitrary and high-handed, and had heaped favors on the soldiery while humiliating the senate; Nerva naturally enough assumed the opposite attitude, and showed himself anxious in every way to respect the traditional privileges of the senate, and such maxims of constitutional government as still survived. Nerva seems, nevertheless, to have soon wearied of the uncongenial task of governing, and his anxiety to be rid of it was quickened by the discovery that not even his blameless life and mild rule protected him against intrigue and disaffection. Early, apparently, in 97 he detected a conspiracy against his life, headed by L. Calpurnius Crassus, but he contented himself with a hint to the conspirators that their designs were known, and with banishing Crassus to Tarentum. This ill-judged lenity provoked, a few months later, an intolerable insult to his dignity. The prætorian guards had keenly resented the murder of their patron Domitian, and now, at the instigation of one of their two prefects, Casperius Ælianus, whom Nerva had retained in office, they imperiously demanded the execution of Domitian's murderers, the chamberlain Parthenius, and Petronius Secundus, Ælianus' colleague. Nerva vainly strove to save, even at the risk of his own life, the men who had raised him to power, but the soldiers, disregarding his protests, brutally murdered the unfortunate men, and finally forced Nerva to propose a vote of thanks for the deed. This crowning humiliation convinced Nerva of the necessity of placing the reins of government in stronger hands than his own. Following the precedent set by Augustus, Galba, and Vespasian, he resolved to adopt as his colleague and destined successor a younger and more vigorous man, and his choice fell upon M. Ulpius Trajanus, already well known as a distinguished soldier, and at the time in command of the legions on the Rhine. In October, 97, in the temple of Jupiter on the Capitol, Trajan was formally adopted as his son, and declared his colleague in the government of the empire. For three months Nerva ruled jointly with Trajan; but, on January 27, 98, he died somewhat suddenly. He was buried in the sepulcher of Augustus, and divine honors were paid him by his successor.

NERVAL. See **GÉRARD DE NERVAL**.

NERVOUS SYSTEM. See **PHYSIOLOGY**.

NESSERODE, **CHARLES ROBERT**, long foreign minister of Russia, was born at Lisbon, where his father was Russian ambassador, in December, 1780. He died in 1862.

NESTOR, the old warrior of the *Iliad*, the wise counselor of the Greek leaders, was the son of Neleus and Chloris. He succeeded his father as king of Pylus. In the *Iliad* he is represented as too old to be of use in battle, but always ready to give advice and counsel to the younger warriors, and to entertain them with long accounts of his own exploits in his youth. According to Homer, he had ruled over three generations of men, and was as wise as the immortal gods. In the *Odyssey* he is described as still ruling over Pylus, where he is visited by Telemachus.

NESTOR, the patriarch of Russian literature, concerning whom we have but little information, except that he was a monk of the Pestcherski cloister of Kieff from 1073. The only other fact of his life told us is that he was commissioned with other monks to find the relics of St. Theodosius, a mission which he succeeded in fulfilling. His history begins with the deluge, as those of most chroniclers of the time did. He appears to have been acquainted with the Byzantine historians; he makes use especially of John Malala and George Armatolus. He also had in all probability other Slavonic chronicles to compile from, which are now lost.

NESTOR, the name applied to a small but remarkable group of Parrots peculiar to the New Zealand sub-region, now usually known as *Nestor meridionalis*, the "Kaka" of the Maoris and English settlers in New Zealand, in some parts of which it was, and even yet may be, very abundant, though its numbers are fast decreasing. The general color of the kaka is olive-brown, nearly all the feathers being tipped with a darker shade, so as to give a scaly appearance to the body. The crown is light gray, the ear-coverts and nape purplish-bronze, and the rump and abdomen of a more or less deep crimson-red; but much variation is presented in the extent and tinge of the last color, which often becomes orange and sometimes bright yellow. The kaka is about the size of a crow; but a larger species, generally resembling it, though having its plumage varied with blue and green, the *Nestor notabilis* of Gould, was discovered in 1856 by Mr. Walter Mantell, in the higher mountain ranges of the Middle Island.

NESTORIUS AND NESTORIANS. Nestorius, patriarch of Constantinople from 428 to 431, was a native of Germanicia, at the foot of Mount Taurus, in Syria. The year of his birth is unknown. On the death of Sisinnius, patriarch of Constantinople (December, 427), Theodosius II., indifferent to or possibly perplexed by the various claims of the local clergy, appointed Nestorius to the vacant see. The consecration took place on April 10, 428. While repressive measures were being carried on outside the pale of the Catholic church, equal care was taken to instruct the faithful in such points of orthodoxy as their spiritual head conceived to be the most important or the most in danger. One of these was that involved in the practice, now grown almost universal, of bestowing the epithet "Mother of God" upon Mary the mother of Jesus. In the school of Antioch the impropriety of the expression had long before been pointed out, by Theodore of Mopsuestia, among others, in terms precisely similar to those afterward attributed to Nestorius. From Antioch Nestorius had brought along with him to Constantinople a co-presbyter named Anastasius, who enjoyed his confidence and is called by Theophanus his "syncellus." This Anastasius, in a public oration which the patriarch himself is said to have prepared for him, caused great scandal to the partisans of the Marian cultus then beginning, by saying, "Let no one call Mary the mother of God, for Mary was a human being; and that God should be born of a human being

is impossible." The opposition, which was led by one Eusebius, a "scholasticus" or pleader who afterward became bishop of Dorvæum, chose to construe this utterance as a denial of the divinity of Christ, and so violent did the dispute upon it become that Nestorius judged it necessary to silence the remonstrants by force; an over-zealous monk who had withstood him to his face was scourged and sent into exile, while many of the mob who sympathized were also punished with the lash.

Matters were soon ripe for foreign intervention, and the notorious CYRIL (*q.v.*) of Alexandria, in whom the antagonism between the Alexandrian and Antiochene schools of theology, as well as the perhaps inevitable jealousy between the patriarchate of St. Mark and that of Constantinople, found an exponent of unexampled determination and unscrupulosity, did not fail to make use of the opportunity. He stirred up his own clergy, he wrote to encourage the dissidents at Constantinople, and he addressed himself to the sister and wife of the emperor (Theodosius himself being known to be still favorable to Nestorius). Nestorius himself, on the other hand, having occasion to write to Pope Celestine I. about the Pelagians (whom he was not inclined to regard as heretical), gave from his own point of view an account of the disputes which had recently arisen within his patriarchate. This implied appeal, however, was the reverse of successful, for the pope, in a synod which met in 430, decided in favor of the epithet "Mother of God," and bade Nestorius retract his erroneous teaching, on pain of instant excommunication, at the same time intrusting the execution of this decision to the patriarch of Alexandria. On hearing from Rome, Cyril at once held a synod and drew up a doctrinal formula for Nestorius to sign, and also twelve anathemas covering the various points of the Nestorian dogmatic. Nestorius, instead of yielding to the combined pressure of his two great rivals, merely replied by a counter excommunication.

In this situation of affairs the demand for a general council became irresistible, and accordingly Theodosius and Valentinian III. issued letters summoning the metropolitans of the Catholic church to meet at Ephesus at Whitsuntide, 431, each bringing with him some able suffragans. Nestorius, with sixteen bishops and a large following of armed men, was among the first to arrive; soon afterward came Cyril with fifty bishops. Juvenal of Jerusalem and Flavian of Thessalonica were some days late. It was then announced that John of Antioch had been delayed on his journey and could not appear for some days; he, however, is stated to have written politely requesting that the opening of the synod should not be delayed on his account. Cyril and his friends accordingly assembled in the church of the Theotokos on June 22d, and summoned Nestorius before them to give an account of his doctrines. The reply they received was that he would appear as soon as all the bishops were assembled; and at the same time the imperial commissioner, Candidian, presented himself in person and formally protested against the opening of the synod. Notwithstanding these circumstances, Cyril and the 159 bishops who were with him proceeded to read the imperial letter of convocation and afterward the letters which had passed between Nestorius and his adversary. Almost immediately the entire assembly with one voice cried out anathema on the impious Nestorius and his impious doctrines, and after various extracts from the writings of church fathers had been read the decree of his exclusion from the episcopate and from all priestly communion was solemnly read and signed by all present, whose numbers had by this time swelled to 198. When the decision was known the populace,

who had been eagerly waiting from early morning till night to hear the result, accompanied the members with torches and censers to their lodgings, and there was a general illumination of the city. A few days afterward (June 26th or 27th) John of Antioch arrived, and efforts were made by both parties to gain his ear; whether inclined or not to the cause of his former co-presbyter, he was naturally excited by the precipitancy with which Cyril had acted, and at a "conciliabulum" of forty-three bishops held in his lodgings shortly after his arrival he was induced by Candidian, the friend of Nestorius, to depose the bishops of Alexandria and Ephesus on the spot. The efforts, however, to give effect to this act on the following Sunday were frustrated by the zeal of the Ephesian mob. Meanwhile a letter was received from the emperor declaring invalid the session at which Nestorius had been deposed unheard; numerous sessions and counter-sessions were afterward held, the conflicting parties at the same time exerting themselves to the utmost to secure an effective superiority at court. In the end Theodosius decided to confirm the depositions which had been pronounced on both sides, and Cyril and Memnon as well as Nestorius were by his orders laid under arrest. Representatives from each side were now summoned before him to Chalcedon, and at last, yielding to the sense of the evident majority, he gave a decision in favor of the "orthodox," and the council of Ephesus was dissolved. Maximian, one of the Constantinopolitan clergy, a native of Rome, was promoted to the vacant see, and Nestorius was henceforward represented in the city of his former patriarchate only by one small congregation, which also a short time afterward became extinct. The commotion which had been thus raised did not so easily subside in the more eastern section of the church; the Antiochenes continued to maintain for a considerable time an attitude of antagonism toward Cyril and his creed, and were not pacified until an understanding was reached in 433 on the basis of a new formula involving some material concessions by him. The union even then met with resistance from a number of bishops, who, rather than accede to it, submitted to deposition and expulsion from their sees; and it was not until these had all died out that, as the result of stringent imperial edicts, Nestorianism may be said to have become extinct throughout the Roman empire. Their school at Edessa was closed by Zeno in 489. As for Nestorius himself, immediately after his deposition he withdrew into private life in his old monastery of Euprepus, Antioch, until 435, when the emperor ordered his banishment to Petra in Arabia. A second decree, it would seem, sent him to Oasis, probably the city of the Great Oasis, in Upper Egypt, where he was still living in 439, at the time when Socrates wrote his *Church History*. The invasions of savage tribes compelled him to seek refuge in the Thebaid, where, however, the governor caused him to be dragged to Elephantis and subsequently to Panopolis. The time, place, and circumstances of his death are unknown; but zeal for theological truth and retributive justice has led at least one historian to exercise his invention in providing a fit end for the friendless heretic. The followers of Nestorius found toleration under the rulers of Persia, from which empire they gradually spread into India and even into Arabia and China. They also succeeded in securing a foothold among the Tartars. Their patriarch had his see for a considerable time at Seleucia-Ctesiphon, afterward in Bagdad, and then in Alkósh. In the thirteenth century he is said to have had twenty-five metropolitans under him. The sect was almost extirpated by Timur.

MODERN NESTORIANS.—The remnants of the Aramæan Nestorians are to be found in diminishing num-

bers partly on Turkish, partly on Persian territory. Since the close of the seventeenth century the Roman Catholic mission, with its headquarters at Aleppo, has, through the powerful support of the French consuls, met with great success among the Nestorians, and has formed the converts into the so-called Chaldæans, or Nestorians connected with the Roman Catholic Church. Those Nestorians who still adhere to their ancient creed are settled on Turkish soil, mainly in the wild and inaccessible regions of eastern Kurdistan, and on Persian soil in the highly fertile plain to the west of the Lake of Urmia.

NESTS. See BIRDS.

NET. A net consists of a fabric of thread, twine, or cord, the intersections of which are firmly knotted so as to form meshes or interspaces of fixed dimensions—the meshes being usually lozenges of uniform size. The art of netting is intimately related to weaving, knitting, plaiting, and pillow-lace and machine-lace making, from all of which, however, it is distinguished by the knotting of the intersections of the cord. It is one of the most ancient and universal of arts, having been in all times commonly practiced among the rudest and most primitive tribes, to whom the net is of great importance in hunting and fishing.

Net-making, as a modern industry, is principally concerned with the manufacture of the numerous forms of net used in fisheries, but netting is also largely employed for many and varied purposes, as for catching game and birds, for the temporary division of fields, for protecting fruit in gardens, for collecting insects, for hammocks, and ship use, for screens and other furniture purposes, for ladies' hair, house bags, etc. While to a large extent net-making continues to be a handicraft, since the early part of the nineteenth century numerous forms of machine have been invented for netting, and several of these have been successfully introduced on a large scale in factories for the manufacture of fishing nets. Such fishing nets were formerly made principally from hemp fiber—technically called "twine;" but since the adaptation of machinery to net-making cotton has been increasingly used. Cotton nets, being more flexible and lighter than those made of twine, are much more easily handled and stowed, and in practice they are rapidly superseding all others.

NETHERLANDS, KINGDOM OF THE. See HOLLAND.

NETSCHER, GASPAR, portrait and genre painter, was born at Heidelberg in 1639. He died in 1684.

NETTLE is the vernacular equivalent of the Latin *Urtica*, which again gives its name to the *Urticaceæ*. The species of *Urtica* are herbs covered with stinging hairs, and with unisexual flowers on the same or on different plants. The male flowers consist of a perianth of four greenish segments inclosing as many stamens, which latter, when freed from the restraint exercised upon them by the perianth-segments while still in the bud, suddenly uncoil themselves, and in so doing liberate the pollen. The female perianth is similar, but incloses only a single seed-vessel with a solitary seed. The stinging hairs consist, at the base, of a bulbous reservoir filled with acrid fluid, and prolonged into a long, slender tube, the extremity of which is finely pointed. By means of this point the hair penetrates the skin and discharges its irritant contents beneath the surface.

NETTLERASH, or URTICARIA, a disorder of the skin characterized by an eruption resembling the effect produced by the sting of a nettle, namely, raised red or red and white patches occurring in parts or over the whole of the body, and attended with great itching and irritation. It may be acute or chronic. In the

former variety the attack appears connected with the digestive arrangements, and often comes on after indulgence in certain articles of diet, particularly various kinds of fruit, shell-fish, cheese, pastry, etc., also occasionally from the use of drugs, such as henbane, copaiba, cubebs, turpentine, etc. There is at first considerable feverishness and constitutional disturbance, together with faintness, which either precede or accompany the appearance of the rash. The eruption may appear on any part of the body, but is most common on the face and trunk. In the former position it causes swelling and disfigurement while it lasts, and is apt to excite alarm in persons unacquainted with its nature. The attack may pass off in a few hours, or may last for several days, the eruption continuing to come out in successive patches. The chronic variety consists in an eruption similar to that above described, but lasting with interruptions for a length of time often extending to months or years. This form of the disease occurs independently of errors in diet, and is not attended with the feverish symptoms characterizing the acute attack. It is probably connected with constitutional conditions, and is occasionally observed in the gouty. As regards treatment, the acute variety generally yields quickly to a purgative and the use of some antacid, such as magnesia or liquor potassæ. The local irritation is allayed by sponging with a warm alkaline solution (soda, potash, ammonia), or a solution of acetate of lead. In the chronic form, in addition to these remedies, any constitutional morbid condition will demand special attention.

NETTLE-TREE is the name applied to certain trees of the genus *celtis*, and belonging to the family *Urticaceæ*. The best-known species have usually obliquely ovate or lanceolate leaves, serrate at the edge, and marked by three prominent nerves. The flowers are inconspicuous, usually hermaphrodite, with a four or five parted perianth, as many stamens, a hairy disk, and a one-celled ovary with a two-parted style. The fruit is succulent like a little drupe, a character which serves to separate the genus alike from the nettles and the elms, to both of which it is closely allied. The wood of *Celtis australis* of southern Europe is made use of for a variety of purposes, while the leaves serve as forage. An oil for burning is extracted from the seed of *Celtis occidentalis*. A North-American species is used for like purposes.

NEU-BRANDENBURG, a flourishing town in Mecklenburg-Strelitz, Germany, situated on a small lake called the Tollenser-See, about sixty miles to the west of Stettin.

NEUBURG, a small town of Bavaria, in the district of Schwaben and Neuburg, is pleasantly situated on the Danube, and in 1880 contained 7,690 inhabitants, three-fourths of whom are Roman Catholics.

NEUCHÂTEL, or NEUFCHÂTEL (Germ., *Neuenburg*), a canton of Switzerland, consisting of a section of the Jura system (see JURA), between the Doubs valley and the Lake of Neuchâtel, is bounded on the northeast and east by Bern, on the southeast by its lake, which separates it from Freiburg and Vaud, on the south by Vaud, and on the west and northwest by France (department of Doubs). The greatest length is about thirty miles, the average breadth eleven, and the area 312 square miles.

NEUCHÂTEL, the capital of the above canton, stands near the north end of the lake, at the mouth of the Seyon, partly on low alluvial ground and partly on the slope of the Jura. It has railway communication by Yverdon with Lausanne and Pontarlier, by Bienne with Basel, by Chaux-de-Fonds with Locle and also with Basel, and by the Val de Travers with Pontarlier. The population in 1880 was 15,612.

NEUCHÂTEL, THE LAKE OF, along with the connected lakes of Morat and Bienne, is the modern representative of the large body of water which at one time occupied the whole lower valley of the Aar. It is twenty-five miles in length, at its broadest part it measures six miles, its maximum depth is five hundred feet, and the area is ninety-two square miles.

NEUHÄUSEL, a town of Hungary, in the district of Neutra, is situated on the river Neutra and on the railway from Pressburg to Pesth, about sixty miles from each of these towns. It was formerly a strong fortress, and played an important part in the wars with the Turks, and in the risings with Bethlen Gabor and Prince Rakoczky, but the works were razed in 1724.

NEUHOF, THEODOR, BARON VON, who for a short time was nominally king of Corsica as Theodore I., was the son of a Westphalian noble, and was born at Metz about 1690. After various adventures he came in 1732 to Florence as representative of the emperor Charles VI. Having here made the acquaintance of several Corsican patriots, he succeeded by expressing strong sympathy with their cause, and promising to gain assistance for them in their resistance to the Genoese, in being accepted as a candidate for the Corsican throne. After fruitless endeavors to interest various European sovereigns in their behalf, he made his way to the dey of Tunis. From him he obtained a shipload of supplies and ammunition, with which he landed at Corsica on March 14, 1736. He was received with the utmost enthusiasm, and in the following April was crowned king as Theodore I. By the help of a body-guard of 400 men, and the lavish distribution of new titles, he succeeded for some time in retaining his position, but failing in an effort to capture Bastia from the Genoese, he at the end of eight months resigned his power into the hands of a council of regency, and left the island. After the departure of the French in 1743 he endeavored to reestablish his authority, but found the faction against him so strong that he was soon compelled again to leave Corsica. He died December 11th of the same year.

NEUILLY-SUR-SEINE, a town of France, at the head of a canton in the arrondissement of St. Denis (department of Seine), lies between the line of the Paris fortifications, the Bois de Boulogne, the right bank of the Seine, and the village of Levallois-Perret, which was formerly included within its limits. The population is 25,235.

NEUMANN, CARL FRIEDRICH, the well-known Orientalist, was born of Jewish parents at Reichmansdorf, near Bamberg, Bavaria, on December 22, 1798. He died in 1870.

NEU-MÜNSTER, a town of Prussia, in the province of Schleswig-Holstein, district of Kiel, lies on both banks of the small river Schale, in the basin of the Stör. In 1880 it contained 11,623 inhabitants, almost exclusively Protestant.

NEUNKIRCHEN, or OBER-NEUNKIRCHEN, a small manufacturing town of Prussia, in the district of Treves and circle of Ottweiler, is situated on the Blies, twelve miles to the northwest of Saarbrücken. The 14,647 inhabitants (1889) consist of Protestants and Roman Catholics in almost equal proportions.

NEURALGIA, literally *nerve pain*, is a term which is frequently employed both technically and popularly in a somewhat loose manner, to describe pains the origin of which is not clearly traceable. In its strict sense it denotes the existence of pain in some portion or throughout the whole of the distribution of a nerve without any distinctly recognizable structural change in the nerve or nerve centers. This strict definition, if adhered to, however, would not be applicable to a large number of cases of neuralgia; for it is well known that in not a few

instances the pain is connected with some source of irritation, by pressure or otherwise, in the course of the affected nerve; and hence the word is generally used to indicate pain affecting a particular nerve or its branches from any cause. There are few ailments which give rise to greater human suffering than neuralgia, and some of the chief causes concerned in its production, or the conditions most frequently found associated with it, may be briefly alluded to.

The pain of neuralgia is generally localized, but may come to extend beyond the immediate area of its first occurrence. It is usually of paroxysmal character, and not unfrequently periodic, occurring at a certain time of the day or night. It varies in intensity, being often of the most agonizing character, or less severe and more of a tingling kind. Various forms of perverted nerve function may be found coëxisting with or following neuralgia. Thus there may be hyperæsthesia, anæsthesia, paralysis, or alterations of nutrition, such as wasting of muscles, whitening of the hair, etc. Attacks of neuralgia are liable to recur, particularly when the general health is low, and some persons unhappily continue to suffer from occasional attacks during the greater part of their lifetime.

In the treatment of all forms of neuralgia it is of first importance to ascertain, if possible, whether any constitutional morbid condition is associated with the malady, for otherwise the most powerful and approved remedies will often fail. Thus, if evidence of rheumatism, gout, anæmia, etc., be present, treatment appropriate to these conditions must be employed.

When the attack is periodic the administration of a large dose of quinine two or three hours previous to the usual time of the seizure will often mitigate, and may even prevent, the paroxysm. In migraine, caffeine and its preparations are recommended. Many topical applications are of great efficacy. The various liniments or ointments containing the preparations of opium, belladonna, or aconite rubbed into the affected part will often soothe the most severe local pain. An excellent sedative application is a lotion composed of equal parts of camphor and chloral painted or gently rubbed over the painful area. In many cases relief may be obtained by the hypodermic injection of morphia or atropia, by acupuncture, by blisters, or by counter-irritation with the button cautery.

NEUROPTERA. See INSECTS.

NEU-RUPPIN, the chief town of a circle in the district of Potsdam and province of Brandenburg, Prussia, lies on the west bank of a small lake (the Ruppiner See), thirty-seven miles to the northwest of Berlin. Its inhabitants are employed in the manufacture of cloth, starch, and machinery, iron-founding, and lithography. In 1880 they numbered 13,985.

NEU-SANDEC, or NEU-SANDEZ, the chief town of a district in western Galicia, lies on the river Dunajec, about forty-five miles to the southeast of Cracow. It contains 11,185 inhabitants, most of whom are Protestants.

NEUSATZ, a royal free town of Hungary, in the province of Bács, and the seat of a Greek non-united bishop, lies on the left bank of the Danube, opposite Peterwardein, with which it is connected by a bridge of boats. It is about 150 miles to the south of Pesth and 50 miles above Belgrade. Nearly one-half of its 21,325 inhabitants are Serbs, the other half being made up of Magyars, Germans, and Jews; and it has recently become a sort of religious and literary center for the Serbs of Hungary.

NEUSOHL, an ancient mining town of Hungary, the capital and see of the district of Sohl, is prettily situated at the confluence of the Gran and the Bistritz, in

a fertile valley inclosed by lofty hills, eighty-five miles to the north of Pesth.

NEUSS, a busy manufacturing town of Rhenish Prussia, lies four miles to the west of Düsseldorf and one and a half miles from the west bank of the Rhine, with which it is connected by the Erft canal, uniting the Rhine and the Meuse. In 1880 it contained 17,495 inhabitants, of whom 16,077 were Roman Catholics.

NEUSTADT, a manufacturing town of Prussia, Silesia, in the district of Oppeln, is situated on the river Prudnik or Prudnitz, sixty miles to the southeast of Breslau. In 1880 the population was 14,292, including 12,300 Roman Catholics.

NEUSTADT, or WIENER-NEUSTADT, an important manufacturing town in Lower Austria, is situated between the Fischa and the Leitha, close to the Hungarian frontier, and twenty-five miles to the south of Vienna. The population in 1880 was 23,468, nearly all Roman Catholics.

NEUSTADT-AN-DER-HAARDT, a small manufacturing town in the Bavarian Palatinate, is picturesquely situated at the base of the Haardt mountains and the mouth of the valley of the Speyerbach, fourteen miles to the east of Spire and the Rhine.

NEUSTADT-EBERSWALDE, at present officially named EBERSWALDE simply, is a manufacturing town of Prussia, province of Brandenburg, situated twenty-eight miles to the northwest of Berlin, on a canal connecting the Oder and the Havel. In 1880 the population was 11,524, including 436 Roman Catholics and 171 Jews.

NEU-STETTIN, a manufacturing town in Prussia, in the province of Pomerania and district of Köslin, lies on the small Streitzig lake, ninety miles to the northeast of Stettin.

NEU-STRELITZ, the capital of the grand-duchy of Mecklenburg-Strelitz, is charmingly situated between two small lakes, sixty miles to the north of Berlin. It is well and regularly built in the form of a star, the eight rays of which converge on a spacious market-place, adorned with a statue of duke George (d. 1860). The ducal residence is a handsome edifice in a pseudo-classical style, with a library of 70,000 volumes, and collections of coins and antiquities.

NEUSTRIA. See FRANCE.

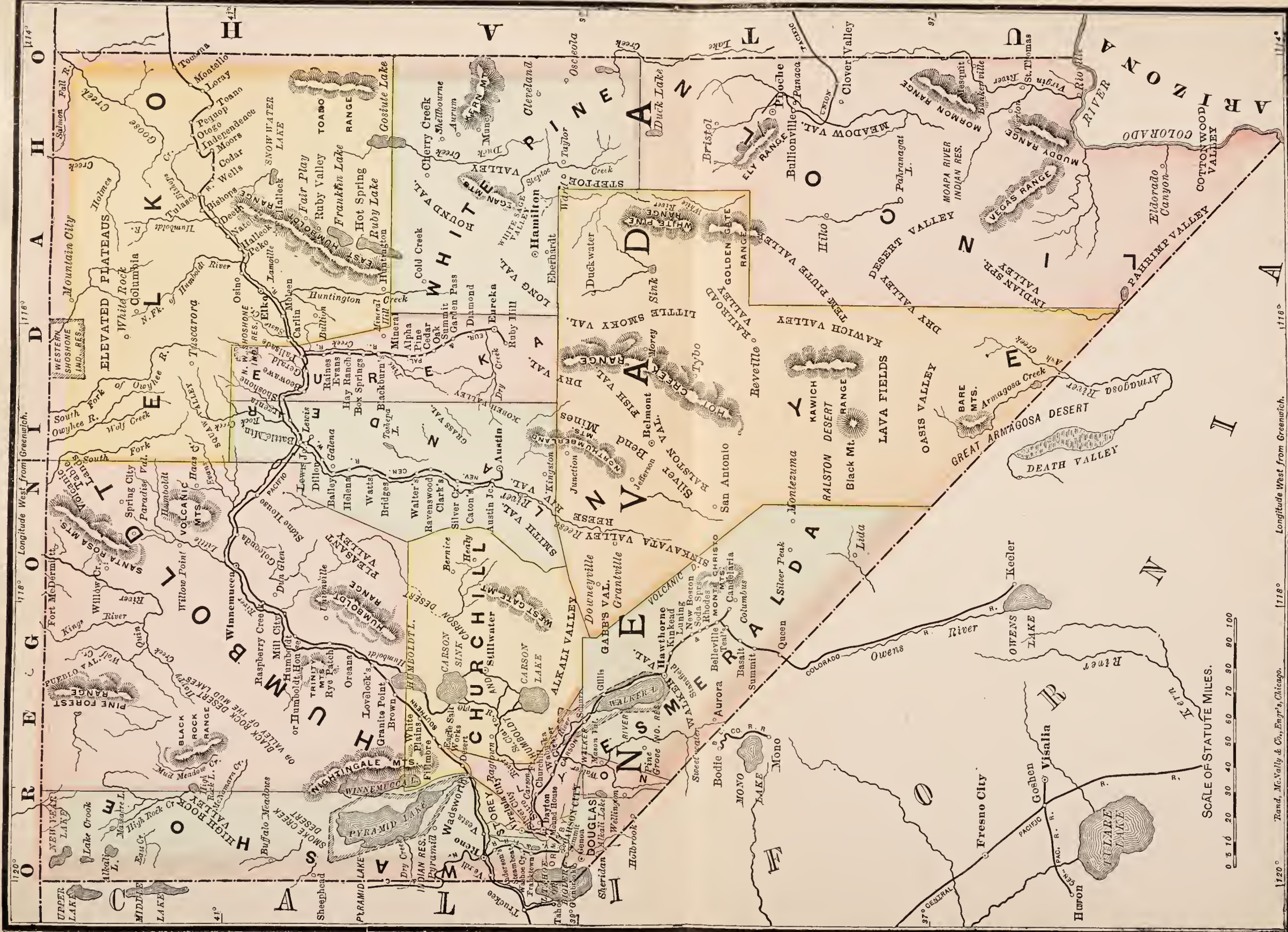
NEU-TITSCH, a small but thriving town of Moravia, is picturesquely situated on an outlying spur of the Carpathians, on the Titsch, an affluent of the Oder, about seventy miles to the northeast of Brünn. It contains (1889) 10,274 inhabitants, almost entirely of German descent.

NEUTRA, the chief town of a district and bishopric of the same name in Hungary, is situated on the river Neutra, ninety miles to the east of Vienna.

NEUTRALITY. See INTERNATIONAL LAW.

NEUWIED, the chief town of a circle in the district of Coblenz, Rhenish Prussia, and the capital of the mediatized countship of Wied, is pleasantly situated on the right bank of the Rhine, eight miles below Coblenz.

NEVA, a river of Russia which carries off into the Gulf of Finland the waters of Lakes Ladoga, Onega, and Ilmen and many smaller basins. It issues from the southwest corner of Lake Ladoga, in two channels which form the island of Oriekhoff, and are obstructed by sandstone reefs, so that the better of the two has a depth of only from seven to sixteen feet in its fairway. A little farther down it becomes completely navigable, and in the neighborhood of the island of St. Nicholas it attains a breadth of 4,200 feet; but between the village of Ostrovkoff and that of Ust-Tosnui (Tosna-mouth) it passes over a limestone bed which, lying only from two to twelve feet below the surface, produces a series



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Longitude West from Greenwich.

of rapids, and reduces the width of the river to from 1,050 to 840 and that of the navigable passage to from 350 to 175 feet. From Ust-Tosnui downward there is no further obstacle.

NEVADA, one of the most western of the States of the American Union, was formed from a portion of the territory acquired by the United States from Mexico by the treaty of Guadalupe Hidalgo. The area is 110,700 square miles. The State is bounded on the south and west by California, north by Oregon and Idaho, and east by Utah and Arizona. At the time of the discovery of the silver mines (1858-59) what is now the State of Nevada was a part of Utah. By act of Congress of March 2, 1861, Nevada became a Territory; and, with a modification of its boundaries, it was admitted as a State on October 31, 1864.

By the upheaval in past ages of the Rocky Mountains and the Sierra Nevada, there was inclosed an ancient sea, several hundred thousand square miles in extent. The draining off and evaporation of the waters so inclosed left an immense plateau, having a general elevation of 4,000 to 6,000 feet above the present sea-level. Although this table-land is spoken of as a "basin," yet throughout its whole extent it is traversed by ranges of mountains rising from 1,000 to 8,000 feet above the general surface, and having the same northward and southward trend as the Sierra Nevada and the Rocky Mountains. The surface of the country as a whole presents a very barren, rocky, and mountainous appearance, yet between the parallel ranges are valleys from five to twenty miles in width, all having about the same altitude above the sea. Where traversed by rivers or creeks these contain considerable areas of arable land, the amounts usually being proportionate to the size of the streams. They are timberless, except for a few cottonwood trees found along the rivers. Upon the mountains the quantity of timber depends upon the altitude. The lower ranges are bare, or contain only a scanty growth of piñon, cedar, or mountain mahogany, of very little economic importance. Several of the higher ranges contain small bodies of valuable timber, while the eastern slope of the Sierra Nevada is well clothed with forests of conifers, which have proved of inestimable value to the people of the State.

The river system is peculiar, only two of the streams of the State finding their way to the sea: the Owyhee, which rises in the northern part, empties into the Snake, and thence passes through the Columbia river to the Pacific Ocean; and the Colorado river, on the southern boundary, flows into the Gulf of California. All the other streams either sink in the sand of the interior valleys or terminate in lakes that have no outlet. The Humboldt river, about 300 miles long, empties into Humboldt Lake or "Sink;" Truckee river, which drains Lakes Tahoe and Donner (in the Sierra Nevada), after a course of 125 miles, falls into Pyramid and Winnemucca Lakes. Walker river, 100 miles long, rises in the Sierra and discharges into Walker Lake; Carson river, 180 miles long, also rises in the Sierra Nevada, and empties into the "Sink of the Carson" or Carson Lake. Reese river rises in the Toyabe Range (within the basin region), and after a course of about 150 miles disappears in the sand; Quinn river, in the northern part of the State, after a course of 80 miles, similarly disappears in the soil; the Amargosa (bitter) river, in the southern part of the State, is 150 miles long, and, after sinking and rising several times, finally loses itself in the sands of Death Valley just over the line in California. Such of the creeks as are not tributaries of the rivers either sink in the sandy plains or end in small pools. Most of the lakes are merely sinks for the scanty streams. In many places on the sides of the mountain ranges are

to be seen well-defined water-lines of the ancient sea or of extinct lakes, indicating a far greater extension of water surface and a much moister climate than at present. Hot springs, many of which have medicinal virtues, are found in all parts of Nevada. The most noted are the Steamboat Springs, in Washoe Valley, on the line of the Virginia and Truckee Railroad.

The climate of Nevada is characterized primarily by its extreme aridity. The air currents from the Pacific are thoroughly drained of their moisture before reaching the borders of the Great Basin, and pass over it as dry winds. In the southern part of the State, where the elevation above sea is least and the temperature highest, the rainfall averages not more than five inches per annum, while the evaporation is extremely rapid. In the northern part the rainfall is greater, averaging not far from fifteen inches in many localities. Nowhere, however, is it sufficient for the needs of agriculture, and consequently irrigation has to be universally resorted to. The mean annual temperature in the habitable portions of the State ranges from 70° Fahr. in the south to 45° in the north. This, however, expresses but a part of the conditions of temperature. The range between summer and winter, and between day and night, is very great.

The fauna of the State is poor, and illustrates, with the flora, the aridity of the climate. Coyotes, badgers, and rabbits are perhaps the most abundant animals, as they certainly are the most characteristic. In the more northern valleys are to be found, in the winter, herds of antelope, and occasionally a few deer and elk. In the Sierra, except where driven away by the encroachments of civilization, large game, consisting of elk, deer, and black and grizzly bears, are still to be found in greater or less abundance. The flora is also scanty, and is characterized by *Artemisia*, so that Nevada is often nicknamed the "Sage-brush" State. In the southern valleys even this fails, and the sterility is relieved by little save *Yucca* and various species of *Cactus*. In the northern valleys, and particularly upon the lower mountains and hills, the bunch grasses replace *Artemisia* to a considerable extent, although not sufficiently to give the interest of meat production great prominence in the State.

The State is rich in mineral productions of all kinds. Silver is, however, the leading mineral product, and the mines of the Comstock at Virginia City and Gold Hill have been among the richest in the world. Since the discovery in 1859 these mines have yielded a large amount of silver and gold, and the product of the whole State hitherto has been about \$123,000,000. Two mines on the Comstock, the California and the Consolidated Virginia (known as bonanza mines), have yielded the greater portion of the silver and gold, the bullion of the Comstock being about one-third gold and two-thirds silver. The rich deposits of the vein, known as "bonanzas," have, however, now been exhausted as far as discovered, and since 1880 the yield from the Comstock lode has been light. Explorations, however, are actively continued. In the Yellow Jack and Belcher mines the workings have reached a depth of 3,000 feet, and in the Ophir and Mexican mines they are drifting at a point 3,100 feet below the surface, the greatest depth to which mining operations have been carried anywhere on the American continent. At these great depths the lode is found to diminish neither in width nor strength of formation. The heat of the rock is intense in these levels, and it is possible for men to work only for very short periods, requiring frequent shifts. The Sutro tunnel, over 20,000 feet in length, drains all the leading mines of the lode to a depth of 1,600 feet, thus saving much pumping. There are millions of tons of low-grade ore in the many mines of the Comstock which will be mined at no distant day, but which cannot

be profitably worked at the present high rates of wages and great cost of transportation and reduction. In the eastern part of the State, at Eureka and several other points, are mines which produce smelting ores containing too much lead to be worked by mill process, as are the free chloride and sulphuret ores of the Comstock. Many of these "base metal veins," as they are called by the miners, are very rich in silver, have been profitably worked for several years, and are still yielding well. All the interior ranges of mountains in the State contain veins producing gold, silver, copper, lead, and antimony in paying quantities, but as yet little mining has been done except for gold and silver. The many rich mines of copper have scarcely been touched. Besides the metals mentioned, there are found within the borders of Nevada iron, platinum, zinc, nickel, cobalt, quicksilver, lignite, gypsum, kaolin, beds of pure sulphur, and in the plains and marshes deposits of pure salt, carbonate of soda, borax, nitrate of potash, and other minerals of a similar nature.

The following table gives the crops for the year 1889:

CROPS.		Acres.	Value.
Indian corn...bushels	24,000	863	\$14,880
Wheat..... "	111,000	5,570	88,800
Oats..... "	196,000	7,858	98,000
Barley..... "	524,000	23,272	340,600
Potatoes..... "	521,000	4,733	406,380
Hay.....tons	250,965	193,050	2,446,909
Total.....		235,346	\$3,395,569

While Nevada is not a country to attract the farmer, there is still a considerable amount of arable land within its borders. At present there are under cultivation only about 235,000 acres. Wherever water for irrigation can be procured, good crops of most kinds of grain, hay, and vegetables may be grown. It has been estimated that by a full utilization of the streams for irrigation possibly 3 per cent. of the area of the State can be brought into cultivation; of this (some 2,000,000 acres) only about one-sixth has as yet been reduced to the service of man. It is not probable, however, that Nevada will ever attain to a high rank as an agricultural State.

The manufacturing interests of Nevada are not extensive, and are confined mainly to the smelting and reduction of ores.

There are several railroads. The Central Pacific crosses the whole State, and has within its limits a length of 452 miles; the Virginia and Truckee runs from Reno, on the Central Pacific, through Carson to Virginia City, and is 52 miles long; the Carson and Colorado leaves the Virginia and Truckee near Virginia City, and running southward through the State taps a rich and extensive mineral and agricultural region. This road is now completed to Benton, Cal., 193 miles, and will eventually connect with the Southern Pacific at Mojave, Cal. The Nevada Central, 93 miles in length, connects the towns of Austin and Battle Mountain; and the Eureka and Palisade, 20 miles long, connects the places named. There are several shorter lines completed, and a considerable number projected.

There are in the State 236 common schools, 7 high schools, and a State university at the town of Elko. In all the large towns are churches of the leading religious denominations, and many of the church edifices are fine and costly structures. Thirty-seven newspapers are published, the majority being dailies.

The returns of the tenth census place the assessed valuation of the real estate of Nevada at \$17,941,030, and the personal property at \$11,350,429, a total of

\$29,291,459. The true valuation was estimated at \$69,000,000 in 1880.

The figures for 1888-89 are as follows: Total debt, \$514,000; annual charge, \$24,360. Gross receipts in 1888, \$855,256.60; disbursements, \$661,528.70. Valuation December 1, 1888, \$26,738,378.53. Tax levy, 9 mills. Total State tax, \$714,827.55. Population, 44,000. Valuation per capita, \$408.22. Tax per capita, \$10.91.

The State government is similar to that of the majority of the western States. Nevada has two representatives in the United States Senate and one in the House of Representatives.

The first settlement in Nevada was made at Genoa, at the foot of the Sierra Nevada, in 1850, though as early as 1848 the Mormons traveling between Salt Lake and California had established a temporary camp at that place. The Mormons made two or three small settlements in the valleys along the base of the Sierra, and until 1859, when the silver mines of the Comstock were discovered, they were the principal white inhabitants. The discovery of silver caused great crowds of miners of all nationalities to pour over the Sierra Nevada from California, and in that year and 1860 several towns were laid out and rapidly built up. In a few years new mineral belts were discovered to the eastward, and soon there were founded many interior towns and camps.

In 1870 the population was 42,491. In 1880 it had increased to 62,266 (1 to 1 $\frac{3}{4}$ square miles), a gain of 46.5 per cent. In 1890 it showed a falling off from the number in 1880. The population shows a great disproportion of males, as is everywhere the case on the frontier, especially in a mining region. The census returns of 1890 showed a total of 45,761. There was also a disproportionately large number of the foreign born, 36,613 being natives and 25,653 foreigners. With the Pacific coast states, Nevada has received a comparatively large accession of Chinese, these numbering 5,416, or more than one-eighth of the whole population of the State. The main body of the population is congregated in the extreme western portion of the State, in Storey and the adjacent counties. A second but much smaller body of population is about Eureka. The balance is dispersed very sparsely. There are comparatively few Indians in the State, and these, known as Pah Utes or Diggers and Shoshones, are theoretically upon reservations in the western part. Their number is estimated by the Indian office at 3,377. They are, as a class, both mentally and physically below the average of the North American tribes.

NEVADA. Nevada is a post-village of Missouri, in Vernon county, of which it is the capital. It lies on the Missouri, Kansas and Texas Railway, ninety miles southwest of Sedalia. It has a courthouse, two newspaper offices, three churches, a bank, two flour-mills and a foundry. Population (1890), 8,000.

NEVERS, a city of France, chief town of the department of Nièvre, and formerly capital of the county of Nevers or Nivernais, is picturesquely situated on a hill commanding the right bank of the Loire at the confluence of the Nièvre, 158 miles south-southeast of Paris by the railway to Nîmes. It is the see of a bishop, and has a fine cathedral, dating from the twelfth and fourteenth centuries.

NEVIANSK, a town of Russia, in the government of Perm, sixty-two miles to the north-northwest of Ekaterinburg, is situated on the eastern slope of the Ural mountains, in the populous valley of the Neiva, surrounded by mountains composed of talc and chlorite schists and granites, in a district very rich in iron and also in auriferous sands. The population in 1881 numbered 13,980 (17,950 with its suburb, the Byngovskiy iron-work).

NEVIS, an island in the Federated Leeward group, British West Indies, separated from St. Christopher by a shallow strait two miles broad at the narrowest. It is a mountain rising gradually to a height of 3,200 feet, the lower portion being cultivable; the total area is about 32,000 acres. The climate is healthy, the average height of the thermometer being 82° Fahr. Discovered by Columbus in 1498, and colonized by the English in 1628, it now forms one presidency with St. Christopher. The population is 11,864; the capital is Charlestown, on the shore of a wide bay on the southwest side of the island.

NEW ALBANY, a flourishing manufacturing city of the United States, in Floyd county, Ind., occupies a good position on the right bank of the Ohio, nearly opposite the west end of Louisville, 156 miles below Cincinnati. It is handsomely built, with wide and well-shaded streets, and among its public edifices are a city hall, a courthouse, an opera-house capable of containing 2,500 persons, a masonic hall, and an oddfellows' hall. Abundant water-power is obtained from the falls about two miles up the river. Besides the glass-works, which rank as the largest in the United States, the industrial establishments comprise foundries, pork-packing-houses, boatbuilding yards, rolling-mills, cotton and woolen mills, and hosiery-mills. Laid out in 1813, and incorporated as a city in 1839, New Albany increased its population from 4,226 in 1840 to 21,000 in 1890, and is still rapidly growing.

NEWARK (or in full NEWARK-UPON-TRENT), a municipal and parliamentary borough and market-town of Nottinghamshire, England, is situated in the midst of a flat but highly cultivated country, near the Trent, on the river Devon, and the Great Northern and Nottingham and Lincoln Railways, 120 miles north of London, and nineteen east of Nottingham. The population of the municipal and parliamentary borough (area 1,933 acres) in 1871 was 12,195, which in 1881 had increased to 21,059.

NEWARK, the principal city of the State of New Jersey, United States, is situated in Essex county, on the west bank of the Passaic river, four miles above Newark Bay, and covers an area of about eighteen square miles. The original site was a crescent-shaped ridge, or double chain of low hills, extending from northeast to southwest, now much changed by leveling and cutting. The main part of the city is on the lower ground which stretches east and south toward the Newark and Hackensack Meadows (salt marshes). The surface is, in general, well adapted for drainage and sewage. The climate is mild, tempered by the proximity of Newark Bay and the Atlantic (twelve miles distant), and the place bears a good reputation for healthfulness. The water-supply comes from the Passaic. There are about 130 miles of streets, generally wide and well shaded, most of which are paved. The principal thoroughfare, Broad street (120 feet wide), is lined throughout a good part of its length with fine old elms, and where not occupied by business premises is fronted by numerous handsome residences. There are several small parks, the principal of which are Military and Washington Parks, bordering on Broad street.

Notwithstanding that the central portion of Newark is but nine miles distant from the general postoffice in New York city—being considerably nearer that point than are the northern portions of New York city proper—Newark has more the character of an independent city than a suburb. This it owes in part to its situation within another State, but still more to its independent and distinctive manufacturing interests. Even prior to 1872 it was called "the Birmingham of America." In that year a very successful exhibition, consisting of the

manufactures of Newark, greatly stimulated the investment of capital.

The United States census of 1880 gives the following statistics of manufactures for Newark:

No. of Industries.	Capital Invested.	Wages Paid Annually.	Total Value of Products.	Persons Employed.		
				Males	Fem.	Child'n
1,319	\$25,679,885	\$13,171,339	\$69,252,705	22,151	5,246	2,649

Since 1880 the increase has been marked, these figures falling far below present estimates.

The principal industries are jewelry, tanning and currying, celluloid (a substitute for ivory, coral, etc.) and celluloid goods, hatmaking, boot and shoe making, trunk and valise making, saddlery hardware, harness-making, breweries (mostly lager beer) and malthouses, building, carriage and wagon making, clothing, chemical works, cigar and tobacco factories, edge tools, hammers, etc., cabinetmaking, and iron and steel works. There are also large cotton, woolen, and silk-thread factories, and an extensive sewing-machine factory, together employing about 3,000 hands.

The shipping facilities of Newark are abundant, and four great trunk lines of railroad—the Pennsylvania, the New York, Lake Erie and Western, the Delaware Lackawanna and Western, and the Central Railroad of New Jersey (Reading Railroad)—give ready communication to all parts of the United States, and with the steamship lines at Jersey City and New York. Newark is intersected by the Morris Canal, and has considerable coasting trade by way of the Passaic river. The city has numerous churches and missions, comprising Presbyterian, Reformed Presbyterian, United Presbyterian, Congregational, Reformed Dutch, Baptist, Episcopal, Reformed Episcopal, Methodist, Lutheran, Roman Catholic, Jewish synagogues, besides Bethel, Universalist, Unitarian, Independent Catholic, and other independent churches. It has an admirable free public school system. The bonded debt of the city is \$11,000,000; sinking fund, \$3,094,000. There are three well-appointed hospitals. The city has six daily newspapers, four English and two German, besides Sunday morning newspapers and weekly German papers.

In 1810 the population of Newark was 6,000; in 1836, when the town became a city, it was 19,732; in 1840 it was 17,290, shortly after which began a stream of immigration which has continued almost uninterruptedly since. In 1850 the population had more than doubled, reaching 38,894; in 1860 it was 71,941, having again almost doubled; during the next decade, including the period of the civil war, it increased to 105,059, and it has since grown in like ratio, being 136,508 in 1880. This had risen to 181,830 in 1890.

History.—On or about May 17, 1666—the exact date cannot be determined—there anchored in the Passaic river, opposite what is now Newark, a small vessel from Milford, Conn., having on board a company of thirty persons, Puritans, who had come to form a new settlement in the New Jersey wilderness. Before the landing was completed, the Hackensack Indians demanded compensation from the new comers, which they finally received. Subsequently another vessel arrived from Connecticut containing a somewhat larger party, but both together numbered, all told, less than seventy persons. Their chief desire was to establish a community whose spiritual and temporal affairs would be controlled and directed "according to God and a godly government." Their pastor was Abraham Pierson, originally from Newark-on-Trent, in whose honor the name of the settlement was changed from Milford to

Newark. The town was laid out in lots, and everything was ordered and governed mainly according to Mosaic law. The foremost among the settlers was Capt. Robert Treat, a brave, resolute, wise, and kindly man, who, after remaining long enough to see the new settlement fairly established, returned to Connecticut, and became governor of the colony. He had previously been deputy-governor for thirty-two years. The dream of Pierson and his Puritan followers was not realized. Before many years the Mosaic bars had to be removed one by one, and gradually the townspeople broadened their ideas of government. But even to this day, despite the cosmopolitan character of the population, the old Puritan leaven is still at work, largely affecting the whole lump.

The first occurrence of special interest in the history of the town after its settlement was a schism in the old church. Col. Josiah Ogden, a rich and influential member and a man of strong individuality, saved his wheat one dry Sunday in a wet season. He maintained that it was a work of necessity; the church declared it to be a violation of God's law. The immediate result was the withdrawal of Ogden and his followers, and the founding of the first Episcopal Church of England Society in Newark—Trinity church. The affair led also to an exacerbating controversy which lasted from 1734 until long after the Revolutionary war, which closed in 1783. Newark was, from 1748 to 1656, the seat of the college of New Jersey, thereafter permanently established at Princeton, founded by the Rev. Aaron Burr, father of the more celebrated American of the same name; the latter was born in Newark. During the war of independence, the great majority of the thousand inhabitants of Newark sided with the Americans; the town suffered severely from the ravages of the British and marauding parties of American loyalists; on the other hand the American revolutionists drove out all loyalists and confiscated their property. After the war manufactures began to prosper, and have continued to do so ever since. At one time chairmaking was carried on extensively, and it is stated that among those who worked at it in Newark was the famous Talleyrand.

NEWARK, a city of the United States, capital of Licking county, Ohio, is situated on the Licking river and on the Ohio and Erie Canal, and is thirty-three miles from Columbus by the railway to Pittsburgh. It is a flourishing agricultural and industrial center, with extensive railway shops, foundries, and manufactories of glass, paper, steam-engines, and agricultural implements; and sandstone quarries and coal-mines are worked in the neighborhood. Some of the most extensive and interesting of the earthwork remains of prehistoric inhabitants of North America are found here. The population was 3,654 in 1850, 6,698 in 1870, and 14,270 in 1890.

NEWARK, DAVID LESLIE, LORD, a celebrated Scottish military character during the civil war, was born in 1601. He was in 1661 created Lord Newark, and received a pension of £500 per annum. He died in 1682. The title became extinct in 1790.

NEW BEDFORD, a city and port of entry of the United States, one of the capitals of Bristol county, Mass., stretches for several miles along the west side of the estuary of the Acushnet river, which opens into Buzzard Bay, and forms an excellent harbor. It is fifty-six miles almost due south of Boston by the Old Colony Railroad. Of the fact that it has been for a long time one of the wealthiest cities in the State, New Bedford affords abundant indications in the character both of its private residences and of its public enterprises and numerous charitable institutions. French avenue, the favorite promenade, was laid out by the munici-

pality in 1853; it runs four miles around the shore of Clark's Point at the mouth of the river, where the United States erected a granite fort in 1860-64. Since the decline of Nantucket New Bedford has been the great seat of the United States whale fishery; in 1854, when the enterprise was at its best, the New Bedford district possessed 410 whalers with a burden of 132,966 tons, but owing to the civil war and other influences (especially the immense production of petroleum) the number was by 1883 reduced to 95. The manufactories of the city, which on the other hand have been increasing in importance, produce cotton goods (460,000 spindles), woollen goods, silver-plated and iron wares, drills for metal-workers, copper sheathings, Prussian blue, paraffin and other candles, glass, cordage, shoes, etc., the total value in 1880 being \$8,880,384. The population was 21,320 in 1870, 26,845 in 1880, and 40,733 in 1890.

New Bedford (Acushnet of the Indians) was settled by Quakers in 1664, but it did not receive its present name till about 1765. The present condition of the city may be seen from the following exhibit: Receipts of treasury, \$1,234,874.12; disbursements, \$658,523.20. Total city debt, \$1,455,164.93. Average property valuation, \$32,738,855. Charity expenditures, \$40,543.55. Four public cemeteries furnish burial facilities. Water-works expenditure, \$138,183.54. The public library contains 53,000 volumes. The fire department comprises 171 men, 6 steamers, 1 hand and 7 hose carriages, 1 aerial hook and ladder company, 2 common hook and ladder companies, 7 coal wagons and 1 telegraph wagon, 25 horses, 11,650 feet of hose, 56 call boxes, 29 miles of wire; cost of department, \$38,876.18. The school population, 7,332; number of schools, 25; teachers, 166. School fund, \$110,503.30; expenditures, \$110,442.98. Books are furnished to pupils, evening schools are maintained by the city; military training is given. The police force numbers 56—1 chief, 2 captains, 6 lieutenants, 47 patrolmen; cost, \$61,700.45. Charities fund, \$42,630.77; expended, \$40,543.55.

NEW BERNE, or NEWBERN, the capital of Craven county, N. C., and the port of entry of the district of Pamlico, is situated at the meeting of the Neuse and the Trent, on the Atlantic and North Carolina Railroad, 107 miles southeast of Raleigh. Vessels drawing eight and a half feet can reach the wharves at mean water-level, and steamers run regularly to New York, Baltimore, and Norfolk. Cotton, lumber, naval stores, fish, rice, corn, and early vegetables for the northern markets are the chief articles of trade. Tobacco factories, turpentine distilleries, candy factories, lumber-mills, a wooden-plate factory, a cotton-seed-oil factory, a rice-mill, and a cigar factory are the most noteworthy of the industrial establishments in the city. The population was 5,849 in 1850, 6,443 in 1880, and 8,000 in 1890. Founded by Swiss settlers in 1701, New Berne continued to be the capital of the province of North Carolina till 1793. It was captured by Burnside in 1862, and suffered from fire.

NEW BRIGHTON, a post-village in Richmond county, N. Y., is situated at the northeastern corner of Staten Island, six miles southwest of New York, with which it is connected by ferry. Best known as the seat of the Sailors' Snug Harbor, a fine building fronting the Kill von Kull, which was founded in 1831 for aged and disabled seamen of the port of New York. New Brighton also contains an asylum for destitute children of seamen, one of the largest dyeing and printing establishments in the United States, a silk-printing factory, a paper-hanging factory, etc., as well as many residences belonging to New York men of business. The population, including Tompkinsville and West

New Brighton, in 1880, was 12,079. Population (1890), 16,423.

NEW BRIGHTON, a post-village of Beaver county, Penn., lies on the Beaver river, three miles from its junction with the Ohio, and opposite Beaver Falls. The water-power of the river here is utilized, and there are considerable manufactures. The town has banks, churches, schools, railroads, and telegraph facilities. Population (1890), 5,603.

NEW BRITAIN, a city of the United States, in Hartford county, Conn., ten miles southwest of Hartford by the New York and New England Railroad. It is the seat of the State normal school (the new building erected in 1881 cost \$90,000), and has a public park of seventy-four acres, a public library, and a good water-supply from a reservoir 200 feet above the level of the streets. The principal manufactures are bronze goods, locks, builders' hardware, cutlery, knit woolen goods, carpenters' tools, and jewelry. In 1870 the population was 9,480; in 1880, 13,979; and in 1890, 19,010. Elihu Burritt was born at New Britain in 1811.

NEW BRITAIN (BIRARA) AND NEW IRELAND, two Polynesian islands, about 340 miles by 23, and 240 by 22 respectively, are separated from the southeast extremity of New Guinea by a strait, first ascertained to be such by Dampier, fifty-two miles wide. They form together a sort of horseshoe, divided in the middle by St. George's Channel, some twenty miles wide, which in 1878 was half-choked, temporarily, by pumice from a neighboring volcano.

NEW BRUNSWICK, a province of Canada, in British North America, is bounded on the northwest by Quebec; north by the Bay of Chaleur; east by the Gulf of St. Lawrence and Northumberland Strait, which separates it from Prince Edward Island; south by a portion of Nova Scotia, Chignecto Bay, and the Bay of Fundy; and on the west by the State of Maine. Its length from north to south is 230 miles, its greatest breadth 190, and it has a seaboard of some 545 miles, interrupted only by the isthmus of Chignecto, which joins the province to Nova Scotia. In shape it is very compact, resembling an irregular quadrangle. Its area is 27,177 square miles.

The surface is generally undulating, but in the northern and northwestern sections there are many ranges of hills which rise to a height of from 1,200 to 2,000 feet, while individual peaks are to be found of even greater altitude. These elevations are an extension of the Appalachian Mountains, and traverse the province from the State of Maine. The scenery is most picturesque and varied, and vast forests abound all through this section of country. The southern region embraces the district along the Bay of Fundy. Its coast is rocky and bold, and interrupted by great ravines. West of the river St. John the soil is fertile and rich, and, though toward the east it is not so deep, there is still a good agricultural country, with many beautiful valleys, grain fields, and forests. Along the shores on the east coast, and for twenty miles inland, the country is flat, and composed of mosses and marshes, but beyond that distance it rises into gently sloping hills, which extend as far as St. John.

The whole of New Brunswick is well watered. Rivers, bays, and lakes are numerous, and several are navigable for vessels of large tonnage. The principal rivers are the St. John, Miramichi, Restigouche, Saint Croix, Petitcodiac, Richibucto, and Nepisiguit. The St. John, which is famous for its scenery, rises in the State of Maine, and is over 450 miles in length. It is navigable for vessels of moderate tonnage from St. John on the Bay of Fundy to Fredericton, a distance of

about eighty-eight miles, but steamers of light draught ply as far as Woodstock, sixty-five miles farther, and during the rainy season boats may proceed to Grand Falls, a cataract seventy or eighty feet high, 225 miles from the sea. Above the falls the St. John has been navigated by a steamer to the mouth of the Madawaska, forty miles. The river is an important highway, especially of the lumber traffic. About 9,000,000 acres of New Brunswick, 2,000,000 acres of Quebec, and 6,000,000 acres of Mainelands are drained by it. Among the many lakes communicating with the St. John is Grand Lake, thirty miles long, and varying from three to nine miles in breadth. The Miramichi rises in the county of Carleton, and flows in a northeasterly direction into a bay of the same name. It is 225 miles long, 7 miles wide at its mouth, and navigable for large vessels as far as Nelson (46 miles). In the spring and autumn, when full freshets prevail, small steamers and towboats can ply a much greater distance. The branches of the Miramichi drain a fourth of the entire province. An extensive lumber trade is done in this district, and many sawmills are driven by the river. Its fisheries are specially valuable, including salmon, trout, bass, smelt, and lobster. The Restigouche forms the northeast boundary of the province, is 100 miles in length, and discharges into the Bay of Chaleur. It is composed of five main branches, from which fact it derives its name, signifying in Indian "the river which divides like the hand." It is a considerable waterway, three miles in width at its mouth, and nine fathoms in depth. Large vessels may safely navigate it eighteen miles from the bay. The main river and its tributaries drain over 4,000 square miles of fertile and well-wooded country. A good deal of lumber is carried on it, and the harbor is secure and safe for ships of ordinary tonnage. The St. Croix separates the State of Maine from New Brunswick at its southwest part. Its source is a chain of lakes called the Chiputneticook. The Petitcodiac is navigable for twenty-five miles for ships, and schooners of eighty tons burden may proceed to the head of the tide, twelve miles farther; it empties into Shepody Bay. The Richibucto discharges into the Gulf of St. Lawrence. The Nepisiguit and Tobique (a tributary of the St. John) in the north are in much repute among anglers.

The coast line of New Brunswick is indented with numerous fine bays and harbors. There are few islands. The Bay of Fundy is a huge arm of the sea extending into the land between New Brunswick and Nova Scotia, and terminating in two smaller bays, Chignecto Bay and the Basin of Minas. Its length up to Chignecto Bay is 140 miles, and its extreme breadth forty-five miles. It is noted for its high tides, which are influenced by the Gulf Stream, and rise about thirty feet at St. John and sixty feet at the head of Chignecto Bay, rushing into the latter with remarkable force. At Bay Verte, fourteen miles distant, the tide rises little more than four or five feet. The Bay of Chaleur, which presents no impediment to navigation, and has several excellent harbors, is over ninety miles in length, and from twenty to twenty-five miles in breadth. On its southern side the shores are low, and on the northern bold and precipitous. The other inlets of consequence on the east coast are Miramichi, Richibucto, Buctouche, Cocagne, and Shediac Bays; on the south coast are Passamaquoddy Bay, St. John Harbor, and Chignecto Bay.

The coal-fields of the province occupy an area of over 11,000 square miles. Iron and plumbago or graphite occur in workable quantities, the deposits of the former being extensive and valuable. Manganese abounds and forms an article of export.

The climate of New Brunswick is somewhat similar to that of the more southern parts of Quebec. It is subject to

pronounced extremes of heat and cold, but is considered healthy, and epidemics are rare. The winters are severe, and snow falls to a great depth, especially in the north, where also wild and cold winds prevail. In the south the winters are milder and more broken. The most charming season is autumn, and particularly that part of it known as the Indian summer, which lasts about six weeks.

Vegetation is rapid. A very large portion of the country is well adapted for agriculture, the soil being exceedingly fertile. On the "intervalles" or low lands enormous quantities of hay are grown, while the yield on the high lands varies from one to three tons per acre. Wheat, oats, buckwheat, rye, barley, hemp, and flax yield good crops, and potatoes, turnips, beets, celery, carrots, parsnips, and peas and beans grow well. The principal fruits are apples, plums, cherries, gooseberries, currants, strawberries, and raspberries. A large export trade of recent years has sprung up in the latter fruits. Hay has always been exported from the province to the United States, where it commands good prices. Farming is not prosecuted in New Brunswick to the extent it should be, and the inhabitants fail to raise enough produce to meet their own wants.

New Brunswick ranks as one of the most amply wooded countries in the world. Great forests of trees cover an extensive portion of its surface, and lumbering forms one of its chief industries. The principal trees are pine, hackmatack, spruce, cedar, beech, maple, hemlock, birch, fir, elm, oak, larch, butternut, ash, poplar, chestnut, and sumach. Though lumbering and fishing form the main occupations of the people, many are engaged in the mining and manufacturing industries. The total value of the produce of the forest exported in 1881-82 was \$4,724,422; of the fisheries, \$753,251; of the mines, \$140,908; of animals and their produce, \$321,426; of agricultural produce, \$256,994; of manufactures, \$365,748. The total value of the exports was \$7,474,407, and of the imports \$6,707,244.

Shipbuilding, which was prosecuted on an extensive scale some years ago, has fallen off considerably of late, owing principally to the fact that iron ships and steamers have taken the place of the wooden craft in the carrying trade. During the year 1882 the number of vessels built in New Brunswick was sixty-six, tonnage 16,820. On December 31, 1882, the vessels registered in the province and remaining on the registry books of the several ports amounted to 1,064, tonnage 308,961. In that year there were engaged in the coasting trade, including steamers and sailing-vessels, 4,435 craft, representing a tonnage of 415,029. The number of saw-mills in the province is 470, employing 7,175 hands. There are also 166 flour and grist mills, and eighty-three tanneries. Other industries are lime-burning, shingle-making, manufacture of woolen cloth and cotton warps, cheese and butter making, sash, door, and blind factories, iron-working, and brickmaking. In 1871 the amount of capital invested in industries was \$5,976,176; in 1881 it reached \$8,425,282—19,922 hands being employed in manufacturing, \$3,866,011 paid in wages, and \$11,060,842 worth of raw materials consumed. The total value of the articles produced was \$18,512,658.

The chief seats of the fisheries are in the harbor of St. John, on the islands at the mouth of the Bay of Fundy, and on the north shore. Cod, haddock, salmon, trout, sturgeon, halibut, whitefish, herring, shad, gaspereaux, smelt, bass, mackerel, and eels comprise the principal varieties taken. Of recent years the fishing business has been most industriously pursued, and several firms have gone extensively into the canning of salmon, oysters, and lobsters for export. Fish-breeding establishments are in operation, maintained by the

Government of the Dominion. In 1881 there were 205 larger vessels and 4,284 boats engaged in the fisheries.

Game is abundant—wild ducks, teal, wild geese, partridges, woodcocks, pigeons, plover, snipe, etc., occurring in great quantity. No fewer than 270 varieties of birds have been already discovered, and ornithologists state that that number can be increased. Of wild animals the principal are the bear, wolf, deer, moose, caribou, lynx, fox, muskrat, mink, marten, ermine, hare, squirrel, and beaver.

The province is divided into fifteen counties, viz., Restigouche, Gloucester, Northumberland, Kent, Westmoreland, Albert, St. John, Charlotte, King's, Queen's, Sunbury, York, Carleton, Victoria, and Madawaska. Up to October 31, 1882, 9,937,433 acres were granted by the government and occupied, leaving 7,455,977 acres still vacant. The population of the province, 285,594 in 1871, was 321,233 (164,119 males, 157,114 females) in 1881.

A large proportion of the population is composed of emigrants from Great Britain and their descendants. In the northern counties and in the valley of the Madawaska there are many settlements of French Acadians, and in the same localities and along the shores of the St. John river there are Indians belonging to the Malicite, Micmac, and other tribes, numbering in all 1,401. During the last forty years these have varied from 1,200 to 1,400. The tribes, though resembling each other in physique and appearance, differ very materially in origin and almost wholly in language. The extent of land granted to the Indian population by the government of New Brunswick is 58,662 acres. Within the last six or seven years a most flourishing colony of Danes has been settled in the province.

The affairs of the province are administered by a lieutenant-governor (salary \$9,000) and an executive council composed of six members with portfolios and three without offices or salary, assisted by a legislative assembly of forty-one representatives and a legislative council of eighteen members. The latter are appointed for life, and the former are elected by the people every four years. The lieutenant-governor is appointed by the governor-general of Canada in council. New Brunswick returns to the Canadian House of Commons sixteen members, and ten senators are appointed by the crown. The public revenue in 1882 was \$643,710, and the expenditure \$614,236.

The present school law was passed in 1871. Under its provisions school trustees of each district are compelled to provide school accommodation for all persons therein between the ages of five and twenty, free of charge. The public charitable institutions receiving aid from the local government are the Provincial Lunatic Asylum and the City Hospital, St. John, and the deaf and dumb school at Fredericton; and the blind school and deaf and dumb asylum at Halifax, N. S., receive an annual grant from the province also. In consideration of this the latter admit pupils from New Brunswick. The lazaretto for lepers at Tracadie and the marine hospital at St. John are maintained by the Dominion.

NEW BRUNSWICK, a city of the United States, capital of Middlesex county, N. J., thirty-one miles by rail from New York, at the head of navigation of the Raritan river, and the eastern terminus of the Raritan and Delaware Canal. The older portion occupies the low land along the river, and has narrow, irregular streets; but the newer districts have spread over the higher grounds behind, and are both well built and well laid out. Conspicuous among the public buildings are Rutgers College and the theological seminary of the Reformed (Dutch) Church. The college was founded in 1770 as Queen's College, and received its present

name in honor of Col. Henry Rutgers (1746-1830) only in 1825. It has a library of 12,000 volumes, and 16 professors and 115 students. The seminary, dating from 1784, consists of eight fine buildings—Hertzog Hall, Suydam Hall, the Gardiner Sage Library (36,000 volumes), and five professors' residences—and occupies a good position to the north of the college. India-rubber goods, hosiery, paper-hangings, shoes, and machinery are manufactured on a large scale in the city. The population was 15,058 in 1870, 17,166 in 1880, and 18,300 in 1890. Settled in the close of the seventeenth century, New Brunswick was incorporated in 1736, and had become, by 1748, a "pretty little town with four churches and a considerable trade with New York." A city charter was obtained in 1784.

NEWBURG, or NEWBURGH, the capital of Orange county, N. Y., occupies a commanding position on the steep slopes of the west bank of the Hudson, about sixty miles north of New York. It has a large river trade, especially in coal and lumber, contains engine-factories, a cotton-mill, a bleachery, a lawn-mower factory, etc. Hasbrouck House, an old stone mansion which served as Washington's headquarters in 1782-83, has since 1850 been maintained by the State, and contains a considerable collection of historical relics. The population was 17,014 in 1870, 18,049 in 1880, and 23,087 in 1890.

The site of Newburg, then occupied by a clan of the Minsis (Delaware) tribe, was recognized by Hudson in 1607 as a "pleasant place to build a town on;" but it was not till 1709 that the Palatine Parish of Quassaic, as it was at first called, was settled by a number of Germans from the Palatinate of the Rhine. In 1752 the name of Newburgh or Newburg was adopted from the likeness which the place bore to Newburgh on the Tay in Scotland. It was here that Washington rejected the proposal to make him king, thereby checking the incipient mutiny which the anonymous "Newburgh Letters" were designed to excite, and here the army was disbanded. A city charter was obtained in 1865.

NEWBURY, a municipal borough and market-town of Berkshire, England, near the Hampshire border, is situated on the river Kennet, the Kennet and Avon Canal, and the Great Western Railway, fifty-three miles west of London and sixteen southwest of Reading. Population (1890) 12,000.

NEWBURYPORT, a city and port of entry of the United States, and one of the county-towns of Essex county, Mass., lies on the right-hand side of the estuary of the Merrimack, and thirty-five miles by rail north-northeast of Boston. At this point the river is crossed by several bridges, one of which, constructed in 1792, was the first suspension bridge in America. The ground on which the city is built rises gradually to a height of about 100 feet; along the top of the ridge, parallel with the river, runs for a distance of three miles High street, the leading thoroughfare, lined with old-fashioned mansions (Caleb Cushing's, Lord Timothy Dexter's, etc.); and at the junction of High street and State street is a pond of three and a quarter acres inclosed by a terraced promenade. The streets in general are umbrageous even for an American city, a special endowment having been left for the maintenance of shadetrees. Old South (Presbyterian) Church in Federal street contains a whispering gallery of a very striking kind, and under its pulpit lie the remains of George Whitefield. The free library, founded by Josiah Little in 1854, and endowed by George Peabody, occupies the old Tracy mansion, and contains upward of 21,000 volumes. Putnam Free School, dating from 1847, with an endowment of \$50,000, and the high school for girls, are both institutions of wide reputation (the latter the first of its

kind in the Union), now consolidated with the high school for boys. The cotton manufacture, introduced in 1836, is the staple of the city, which also, however, contains shoe factories (one of them said to be the largest manufactory of women's shoes in the world), an iron foundry, a distillery, carriage-works, hat factories, etc., and has long been the seat of extensive shipbuilding operations (tonnage 4,000 in 1882). The harbor (formed by the northern end of Plum Island, which is united to the city by a causeway) is of somewhat difficult access, owing to the shifting character of the bar, which becomes altogether impassable during storms from the east. The population of the city was 13,401 in 1860; 12,595 in 1870, and 13,947 in 1890.

NEW CALEDONIA, the largest island in the Pacific after New Zealand, about 240 miles long, with an average breadth of twenty-five miles, lies at the southern extremity of MELANESIA (*q.v.*), and, like all the chief islands of that chain and the chain itself, runs northwest and southeast. It was discovered by Cook in 1774, and was appropriated by the French for a convict settlement in 1853. Their capital, Nouméa, with a fine harbor, is near the south end of the island. An almost unbroken barrier reef skirts the west shore at about five miles distance; on the east, which is more abrupt and precipitous, it is much interrupted. To the north the reefs continue, marking the former extension of the land, for about 160 miles, ending with the Huon Islands. Hunea, or Isle of Pines, so called from its araucarias, geologically a continuation of New Caledonia, lies thirty miles from its southeast extremity. It abounded formerly in sandalwood, and consists of a central plateau surrounded by a belt of cultivation. New Caledonia consists essentially of confused masses and ranges of mountains, rising at Mount Humboldt to 5,380 feet, the plains being chiefly the deltas of rivers. The landscape is rich and beautiful, varied with grand rock scenery, the coast-line being broken by countless streams, often skillfully utilized by the natives for irrigation. The larger rivers in the wet season form impassable morasses. The framework of the island consists chiefly of argillaceous, serpentinous, and mica schists. The famous nickel mines lie in the Kanala district, and extend for some sixty miles along the east coast, the rocks being coated with the green ore, which also occurs in pockets, and is extensively worked. There are also mines of copper and cobalt. In the low lying districts to the southeast are several lakes and morasses of black mud, and blocks of ironstone so abundant as to affect the compass.

The free white population, settlers and miners, numbers about 3,000; officials and troops, 3,000; transportés and déportés (ordinary and political convicts), with their families, 4,000 and 6,700 respectively. Some of the planters and graziers are fairly prosperous, but the material development of the country does not advance rapidly.

NEWCASTLE, or in full, for the sake of distinction, NEWCASTLE-UPON-TYNE, a city (with the constitution of a county), municipal and parliamentary borough, market-town, and seaport in the county of Northumberland, England, is situated on the north bank of the river Tyne, eight miles above its mouth, and on the main line of the Northeastern Railway, 275 miles north of London and 70 east of Carlisle. The business portions of the town—principally erected from the plans of Richard Grainger—are characterized generally by spacious streets with imposing buildings and fine shops; and in the northern and western suburbs there are numerous terraces and villas inhabited by the wealthier classes. The important town of GATESHEAD (*q.v.*), on the south side of the river, is connected with

Newcastle by three bridges—a high level bridge, a hydraulic swing bridge, and a suspension bridge. About half a mile farther up the stream is the Redheugh bridge, commenced in 1867, and opened in 1871 at a cost of \$200,000. Newcastle is well supplied with public parks and recreation grounds.

The most important public buildings are the corporation buildings, including a large public hall, and a corn exchange, erected (1863) at a cost of \$500,000; the guild-hall, originally a hospital called the Maison de Dieu, and afterward used as "the stately court of merchant adventurers," reërected in 1658; the moot-hall (1810) for the meetings of assizes and sessions and the transaction of county business; the exchange (1860); the central news-room and art gallery (1838); the assembly-rooms (1774, reërected 1876); the barracks (1806); the market (1835); the central railway station, opened 1849, at a cost of \$620,000; the police courts (1874); the general postoffice (1876); the Wood memorial hall (1870), used for the meetings of the North of England Institute of Engineers; the custom-house; the theater royal; Trinity house, with a chapel dating from 1491; and the (branch) Bank of England.

The Grey monument in Grey street, an Ionic column surmounted by a statue of Earl Grey, was erected in 1836 to commemorate the passing of the Reform Bill; the Stephenson monument near the railway station was erected in 1862.

The principal educational establishments are the colleges of medicine and of physical science, affiliated to the university of Durham, the royal free grammar school, founded in 1525, and rebuilt by the town council in 1870 out of the funds of the hospital of St. Mary; the school of science and art in connection with South Kensington, opened in 1879; and Allan's endowed schools, founded in 1705, and reorganized by the charity commissioners in 1877. Among the clubs and similar institutions are the Literary and Philosophical Society, founded in 1793, possessing buildings erected in 1825 at a cost of \$80,000; the Society of Antiquaries, founded in 1813, with a museum in the castle; the Natural History Society; the Tyneside Naturalists' Club, established in 1846; the Mechanics' Institution, 1824; the North of England Institute of Mining Engineers, 1852; the Fine Arts Society; the Farmers' Club; the Northern Counties Club; the Union Club; and the University Club. There is a public library and news-room, erected at a cost of \$100,000. The benevolent institutions include the infirmary (originally founded in 1751 and enlarged in 1801 and 1851), the dispensary (1777), the fever-house (1803), the lying-in hospital (1760), the eye infirmary (1822), Trinity almshouse (1492), the hospital of the Holy Jesus (1682), the keelmen's hospital (1701), the female penitentiary (1831), the Royal Victoria asylum for the blind (1838), the Northern Counties institution for the deaf and dumb (1839), the Northern Counties female orphan institution, and the Philipson memorial orphanage for boys (1876).

Newcastle owes its prosperity to its convenient situation on a tidal river, and to the immense stores of coal in the neighborhood, which, besides being largely exported, have stimulated a great variety of industries which are dependent on their use.

In the annual statement of the shipping of the United Kingdom for 1882, the returns for the coasting trade are not given for Newcastle separately; but for the Tyne ports, which include, in addition to Newcastle, North and South Shields, the numbers were—entered with cargoes and in ballast 10,152 of 3,377,108 tons, cleared 8,214 of 2,361,248 tons. Within the present century the population of Newcastle has more than quadrupled. It amounted to 160,983 in 1889.

Newcastle owes its origin to the *Pons Ælii*, a Roman bridge constructed by the Emperor Hadrian. The most important relics of Roman occupation are a well in the center of the buildings of the old castle, a mutilated statue of Hercules and a figure of Mercury preserved in the castle, numerous coins, altars, and various specimens of Roman pottery. The foundations of the old Roman bridge, with the remains of the piers, were discovered during the dredging operations after the destruction of the old wooden bridge in 1771. On account of its position as a fortified town affording protection to the inhabitants of the monasteries of Tynemouth, Jarrow, Lindisfarne, and Wearmouth, Newcastle was known in early times as Monkceastre or Monkchester; along with these monasteries it was ravaged by the Danes, who massacred the monks and nuns within its walls. After the union of the kingdom under Egbert it continued till the Conquest to be the residence of the earls of Westmoreland and Northumberland. The town was destroyed by William the Conqueror in 1068, after he had defeated Edgar Atheling and Malcolm of Scotland on Gateshead Fell, but in 1080 a fortress was reared at it by Robert Courthose, eldest son of the Conqueror, which, in contradistinction to the old fortress, was named Newcastle, and formed the nucleus of the present town, burgesses being gathered round the fortress to defend the country against the Scots.

NEWCASTLE, a city of New South Wales, and the principal seaport of the northern coast, is situated on a steep acclivity rising from the sea, at the mouth of the Hunter river, about seventy-five miles north of Sydney. The population of the census district in 1881 was 15,595.

NEWCASTLE, a thriving post-borough of Pennsylvania, the capital of Lawrence county, two miles above the junction of the Shenango and Mahoning (sub-tributaries of the Ohio) and forty-five miles north-northwest of Pittsburgh. It contains blast furnaces, rolling-mills, iron and brass foundries, tube-works, boiler-works, machine shops, planing-mills, nail factories, glass-works, grist-mills, and breweries. The population increased from 6,164 in 1870 to 8,418 in 1880, and was returned at 11,600 in 1890.

NEWCASTLE-UNDER-LYME (or LYNE), a municipal and parliamentary borough of Staffordshire, England, is situated on a small stream, the Lyme brook, and near the Grand Trunk Canal, sixteen miles north-northwest of Stafford, and thirty-five south from Manchester. The population of the parliamentary borough was 15,948 in 1871, and in 1881 it was 17,493. The municipal borough, which was slightly increased in extent in 1877, had 17,506 inhabitants in 1881.

NEWCASTLE, DUKES OF. Within the space of a century there were no less than four successive creations of dukes of Newcastle. William Cavendish, nephew of the first earl of Devonshire, was raised to the dignity of duke of Newcastle-upon-Tyne in 1664. His son and successor Henry died leaving daughters only, and one of these married John Holles, earl of Clare, who was created duke in 1694. This duke died also without male issue in 1711, leaving his estates to his sister's son, Thomas Pelham, who, with other dignities, had the title of duke of Newcastle-upon-Tyne conferred on him in 1715, and a second and similar ducal title (that of Newcastle-under-Lyme) in 1757. His first dukedom became extinct at his death, but the second title was granted him with remainder to the earl of Lincoln, at once his nephew and nephew-in-law, whose descendants (Pelham-Clintons) have been dukes of Newcastle-under-Lyme in direct lineal succession down to the present time.

NEW-CHWANG, a city of China, in the Manchurian province of Liau-tung (Shing-king or Fing-tien),

is situated about thirty-five miles (ninety miles by water) from the coast of the Gulf of Liau-tung, on what is now a small branch of the main eastern affluent of the Liau-ho or Sua-muren. The city proper is a comparatively unimportant place with broken-down walls, but it is surrounded by a number of large and most flourishing suburbs. About the beginning of the present Ta-tsing dynasty (1644) New-chwang was the chief port on the river, but in the reign of Keen-lung, owing mainly to physical changes, it was supplanted by Tien-chwang-tai farther down the stream, and toward the close of the eighteenth century this had in turn to give place to Ying-tze still nearer the mouth. In ignorance of these facts New-chwang (now scarcely to be reached by a flat-bottomed river boat) was chosen as one of the ports to be opened to foreign trade by the treaty of Tien-tsin; and, though Ying-tze had of necessity to be adopted as the site of the foreign settlements, Europeans still continue to speak of the port of New-chwang. The port was opened to foreign trade in 1858.

NEWCOMEN, THOMAS, one of the inventors of the steam-engine, was a native of Devonshire, and was born about the middle the seventeenth century. He died about 1713. (See STEAM-ENGINE.)

NEW ENGLAND is the northeastern portion of the United States, comprising the six States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island. It formed part of the territory of "North Virginia" granted by James I. to the Plymouth Company in 1606; and in 1614 the name of New England was bestowed upon it by Capt. John Smith (1579-1631), whose *Description of New England* appeared at London in 1616.

NEWFOUNDLAND. This island, which is a British colony, lies off the eastern coast of North America, directly across the Gulf of St. Lawrence. Its southwestern extremity approaches within 50 miles of Cape Breton, while its most easterly projection is only 1,640 miles from Valentia, on the coast of Ireland. Its great length, from Cape Ray to Cape Norman, is 317 miles; its greatest breadth, from Cape Spear to Cape Anguille, 316 miles; and the total area about 42,000 square miles. Its figure roughly approaches an equilateral triangle. Two large peninsulas project from the main body of the island.

The part of the island near the sea consists of a hilly country with eminences of no great elevation. The interior proper consists of an elevated undulating plateau, traversed here and there by ranges of low hills, the surface being diversified with valleys, woods, lakes, ponds, and marshes. Much of this is a savanna country, sustaining vast herds of reindeer. All the great hill ranges take a northeasterly and southwesterly direction, the highest land occurring along the western and southern shores. The principal mountain chain, the Long Range, extends along the western side of the island for nearly its entire length, and has peaks more than 2,000 feet high, and parallel to this, but nearer the coast, is the Cape Anguille range. The peninsula of Avalon is very hilly; but the highest summits do not exceed 1,500 feet. The country is remarkable for a number of isolated sharply-peaked summits which rise abruptly here and there from the level plain, and bear the local name of "tolls."

The largest river is the Exploits, 200 miles in length, having a drainage area of between 3,000 and 4,000 square miles. It rises in the extreme southwestern angle of the island, and flows in a northeasterly direction through Red Indian Lake, terminating in the Bay of Exploits, Notre Dame Bay. The valley through which it flows contains large areas of fertile land, capable of yielding crops of all kinds, and in many

places is covered with pine forests containing timber of large growth. The next largest river is the Humber, which rises twenty miles inland from Bonne Bay, and after a circuitous course empties itself into Deer Lake, thence flowing into the Bay of Islands. It drains an area of 2,000 square miles. The Gander, which rises near the southern coast, and, flowing near Gander Lake, falls into Gander Bay on the east, has a drainage area of 2,500 square miles.

One of the most remarkable of the physical features of the island is the immense number of lakes and ponds, which occupy nearly a third of the whole surface. The largest is Grand Lake, fifty-six miles in length, and covering an area of 192 square miles. It contains an island twenty-two miles in length and five in breadth. Red Indian Lake is thirty-seven miles long and sixty-four square miles in area; Gander Lake and Deer Lake occupy thirty-three and twenty-four square miles respectively; Sandy Lake, Victoria, Hind's, Terra Nova, and George IV. Lake range next in size. The shores of these great lakes, and the fertile valleys through which their rivers flow, are as yet absolute solitudes, the very existence of which was until recently all but unknown.

The climate is more temperate than that of most portions of the neighboring continent. It is but rarely, and then only for a few hours, that the thermometer sinks below zero in winter, while the summer range rarely exceeds 80° Fahr., and for the most part does not rise above 70°. The Arctic current exerts a chilling influence along the eastern coast, but as a compensation it brings with it the enormous wealth of commercial fishes and seals which has rendered the fisheries the most productive in the world. The Gulf Stream, while it creates fogs, modifies the cold. The salubrity of the climate is evidenced by the robust, healthy appearance of the inhabitants. Open fireplaces are sufficient to warm the houses, and free exercise in the open air is attainable at all seasons. Winter sets in, as a rule, in the beginning of December, and lasts until the middle of April. Generally the snow lies during this period, and the frost rarely penetrates the ground to a greater depth than a few inches. Spring is sometimes late in arriving, but once vegetation sets in it advances with marvelous rapidity. The autumn is usually very fine, and is often prolonged till November. There is nothing in the climate to interfere with agriculture. Tornadoes are unknown, and thunderstorms are very rare. Fogs, of which so much is said in connection with the country, are confined to the shores and bays of the southeastern and southern coasts.

Among the well-known wild animals indigenous to the country the caribou or reindeer holds a conspicuous place. They migrate regularly between the southeastern and northwestern portions of the island. The winter months are passed in the south, where "browse" is plentiful, and the snow is not too deep to prevent them from reaching the lichens on the lower grounds. In March they begin their spring migration to the barrens and mountains of the northwest. In May or June they bring forth their young. As soon as the frosts of October begin to nip the vegetation they turn south. September and October are the best months for stalking. In addition to the caribou, the wolf and black bear are found in the interior; the fox (black, silver, gray, and red), beaver, otter, arctic hare, North-American hare, weasel, bat, rat, mouse, and musquash or muskrat are numerous. The famous Newfoundland dog is still to be met with, but good specimens are rare, and he appears to thrive better elsewhere. The common dogs are a degenerate mongrel race. It is estimated that there are 300 species of birds in the island, most of

them being migratory. Among them may be enumerated the eagle, hawk, owl, woodpecker, swallow, kingfisher, six species of fly-catchers and the same number of thrushes, warblers and swallows in great variety, finches, ravens, jays. The ptarmigan or willow grouse is very abundant, and is the finest game-bird in the island. The rock ptarmigan is found in the highest and barest mountain ridges. The American golden plover, various species of sandpipers and curlews, the brent goose, ducks, petrels, gulls, and the great northern diver are met with everywhere. The great auk, now extinct, was once found in myriads around the island. The little auk, guillemot, and the razor-billed auk are abundant. No venomous reptiles, toads, or frogs occur. Of molluscous animals the common squid, a cephalopod about six or seven inches in length, visits the coasts in immense shoals in August and September, and supplies a valuable bait. A gigantic species of cephalopod was discovered in 1873, which excited much interest among naturalists; the body varies from seven to fifteen feet in length, with a circumference of five or six feet; from the head ten arms radiate, the two longest (tentacles) being from twenty-four to forty feet in length, and covered with suckers at their extremities; the other eight arms vary from six to eleven feet, and on one side are entirely covered with suckers.

The pine, spruce, birch, juniper, and larch of the forests of the interior furnish ample materials for a large timber trade as well as for shipbuilding purposes. The white pine grows to the height of seventy or eighty feet in some places, and is three or four feet in diameter. The mountain ash, balsam poplar, and aspen thrive well. Evergreens are in great variety. The berry-bearing plants cover large areas of the island. The maidenhair or capillaire yields a saccharine matter which is lusciously sweet. Flowering plants and ferns are in vast varieties, and wild grasses and clover grow luxuriantly. Garden vegetables of all kinds, and strawberries, raspberries, gooseberries, currants, etc., thrive well.

The fisheries constitute the grand staple industry of the country. The most important is that of the cod, which is the most extensive of the kind in the world. The cod are taken on the shores of the island, on the Banks, and along the coast of Labrador. The Bank fishery is now prosecuted chiefly by the French and by Americans, Newfoundlanders occupying themselves chiefly with the shore and Labrador fishery. The aggregate annual catch of cod at present in the North-American waters is estimated at 3,700,000 quintals, say 150,000,000 fish. The value at \$4 a quintal would be \$14,800,000. Nearly four-fifths of the entire returns of the Newfoundland fisheries arises from the cod fishery.

While the cod fishery does not show any marked advance in the quantities taken during the last thirty years, the market value of dried codfish has risen more than 50 per cent., and the average value of exported products of the fishery may be fairly reckoned at \$5,500,000 per annum. Adding to this the local consumption, we must place the entire annual value at \$6,364,000.

The last census showed that there were about 53,000 persons engaged in catching and curing fish out of a population exceeding 180,000. The French Newfoundland fisheries on the Banks and along the shores average from 400,000 to 500,000 quintals—the number of men employed being 5,000 to 6,000. The cod fishery has been prosecuted for about 400 years, but, notwithstanding the enormous drafts every year, to all appearance the cod are as abundant as ever.

Next to the cod fishery in value comes that of the seal, which is not more than eighty years old. At present the average annual value of the seal fishery is about \$1,100,000, being an eighth part of the entire exports.

The number of men employed is from 8,000 to 10,000. Steamers were first used in 1863, and now there are about twenty-five engaged, some of them from 400 to 500 tons burden; sailing-vessels are rapidly diminishing in numbers.

There are no finer salmon streams than those of Newfoundland, but no proper measures have been taken for their preservation, and in consequence such practices as closing the mouths of the rivers with nets at a time when the fish are ascending to spawn, and constructing weirs, traps, and dams, have been followed to such an extent that in many of the rivers salmon are almost exterminated. The average value of the pickled and fresh salmon exported, during the last twenty years, has been about \$106,000 per annum. Until recently the chief mode of curing the salmon was salting.

The chief seats of herring fishery are Fortune Bay, St. George's Bay, Bay of Islands, Bonne Bay, and the whole coast of Labrador. The finest fish are those taken off Labrador and the Bay of Islands. The value of herrings exported is \$358,359, and of those sold to the French and Americans as bait about \$150,000 per annum. Allowing 73,000 barrels for home consumption, at \$3 per barrel, the total value of the annual catch of herrings is \$727,359. But few halibut or haddock are taken. Within the last few years the exportation of preserved lobsters has increased rapidly. Lobster factories have been established at various points.

Up to a comparatively recent period the people of Newfoundland were so exclusively engaged in the fisheries that no attention was given to agriculture; and persons who were interested in keeping the inhabitants on the seacoast employed in fishing systematically represented the country as hopelessly barren. That this is not the case has been conclusively proved by the geological survey.

The first copper-mine was opened in 1864, and at the end of 1879 the customs returns showed that copper and nickel ore to the value of \$5,000,000 had been exported in the interval. At present Newfoundland stands sixth among the copper-producing countries of the world. The mines are all situated around the shores of the Bay of Notre Dame; and until the interior is opened by roads and railways this will be the chief scene of mining enterprise. Many other minerals besides copper have been found, such as lead (in many places), silver, and magnetic iron ore; gold was recently discovered in one locality. In St. George's Bay there are large workable seams of coal. Gypsum exists in great abundance in the Carboniferous region, especially at Codroy and around St. George's Bay. Marbles of almost every shade are found on various parts of the coast; limestone, granite of the finest quality, roofing slate, and building stones are abundant.

The earliest estimate of the resident population of Newfoundland was made in 1654, when the total amounted to 1,750. In 1680 it reached 2,280; in 1763, 7,000; in 1804, 20,000; in 1832, 60,000; in 1836, 75,094; in 1857, 124,288; in 1869, 146,536; and in 1874, when the last census was taken, the total population was 161,374. It is now (1890) 200,000. St. John's, the capital, contained a population of 15,000 in 1835, and in 1890 it was close on 35,000.

Education is conducted on the separate or denominational principle, each religious denomination receiving an amount for its elementary schools and academies proportionate to its numbers.

NEW GRANADA. The vast regions of the north-west of South America conquered by Spanish adventurers in the first half of the sixteenth century received from Quesada, one of the great leaders of the move-

ment, the title of the New Kingdom of Granada. It was not till 1718, however, that the Spanish Government granted the president of the colony, Pedroza y Guerrero, the rank of viceroy; and at the desire of his successor, Jorge Villalonga, the honor was again withdrawn. In 1739 the New Kingdom of Granada was reestablished under a viceroy, whose authority extended over the provinces of Terra-firma (state of Panama), Cartagena (state of Bolivar), Santa Marta and Riohacha (state of Magdalena), Maracaibo, Caracas, Cumana, and Guiana (republic of Venezuela), Antioquia (state of Antioquia), Pamplona and Socorro (state of Santander), Tunja (state of Boyaca), Santa Fé (state of Cundinamarca), Neyva and Mariquita (state of Tolima), Popayan and Pasto (state of Cauca), and Quito, Cuenca, and Guayaquil (republic of Ecuador). In 1777 the provinces of Maracaibo, Caracas, Cumana, and Guiana were separated from the viceroyalty to form the captaincy-general of Venezuela. For the republic of Colombia (1820-30), the republic of New Granada (1831-61), and the United States of Colombia (1861 to the present time which have successively taken the place of the viceroyalty), see COLOMBIA.

NEW GUINEA, the largest island in the world (excluding Australia), lies immediately north of Australia. It is 1,490 miles long, with a maximum breadth of 430 miles, its area being about 306,000 square miles.

It was probably in Miocene times, if not later, united to Australia; the average depth of Torres Straits, which are eighty miles wide, is only eight or nine fathoms, and the maximum twenty-three-fourths of the distance being occupied by coral reefs, a prolongation of the great eastern barrier reef of Australia. At either end of New Guinea a few large islands, with a number of smaller islets, are only separated from the mainland by narrow channels. From difficulties connected with the navigation, the climate, and the people, the coasts are still imperfectly surveyed, while of the interior, relatively to its vast extent, very little is known.

The north coasts are sometimes level, as at parts of Geelvink Bay and the extensive delta of the great Amherst river, at Walckenaar and Humboldt Bays, and farther east toward Cape della Torre, near which, and near Huon Gulf, there are large rivers; otherwise the shores are steep-to, and apparently rising, with promontories jutting twenty to forty miles out, and some good harbors. There is no barrier reef off this coast. High distant mountains are observed at every opening, those toward the east rising in successive and highly fertile terraces to some 13,000 feet.

The climate of the coast is unhealthy, especially during the transition between the monsoons, which is long and irregular owing to the action of the high mountain ranges on these winds. The heat is tempered by the heavy rainfall, discharged by the northwest monsoon chiefly in the west and north; the southeast monsoon also is often wet, especially in the east and south districts. Torres Straits is healthier, though the heat is great and the amount of salt in the air is trying to many. From July to September the force of the southeast monsoon there is such that even steamers cannot always face it and the tide together.

The flora is mainly that of the Indian Archipelago, which predominates even in the islands of Torres Straits; but on the shores of the Gulf of Papua, and inland, Australian vegetation is represented by *Eucalyptus*, acacias, and *Pandanus*; and Australian types are found as far north as Humboldt Bay. Over great part of New Guinea dense forests prevail, clothing the mountains to a height of several thousand feet, the timber of enormous height, though the species are fewer than in the great islands of the archipelago. Among

cultivated plants are the banana, papaya, orange, sugar cane, maize, millet, taro (*Arum esculentum*), *Abelmoschus Manihot*, *Jambosa*, yams, sweet potato, and pumpkins, and among the Amberbaki the dry rice. The cocoa-palm grows everywhere; the sago-palm grows wild in abundance in the swamps, and in the northwest each hill tribe, apparently to avoid collisions, draws its supplies from a different district of the coast. They have also in the hills a tree called "sali," with top and pith resembling sago. Tobacco of good quality is brought down from the interior, and an illustrious antiquity is claimed for the plant by a tradition which describes it as the miraculous fruit of a woman named Heva.

New Guinea is very poor in *Mammalia*. The large animals reported by travelers may possibly be gigantic marsupials akin to those found fossil in the Queensland Pleistocene. The wealth and beauty of the avifauna are great. Count Salvadori gives 1,028 species, belonging to 321 genera, for the Papuan sub-region (*i.e.*, from the Solomon Islands westward to, but excluding, Celebes). Of these about 470 are peculiar to New Guinea and the adjacent islands, including Aru. The more numerous and important genera are preëminently Australian in character, with many species peculiarly developed. There is also, as might be expected, a considerable number of Malayan forms, some common to the whole region, some only found here and at other far distant spots in it. The most remarkable orders, besides the birds of paradise, which are only found in New Guinea and the neighboring islands, are the honeysuckers, flycatchers, parrots, kingfishers, and pigeons, all rich in special forms. Birds of prey are rare; vultures, pheasants, woodpeckers, and finches absent. Of snakes, which may migrate freely on floating timber, we find out of twenty-four genera (belonging to eleven families) six Oriental, four Australian, and only four specially Papuan; of lizards three families with twenty-four genera, of which only three are peculiarly Oriental, three Australian, six Papuan. The *Amphibia* (six families with eight genera), for which the salt water is a barrier, have no western affinities, and those not of wide distribution are almost exclusively Australian—a fact of obvious geological significance. The *Lepidoptera* are numerous and singularly beautiful, as are the *Coleoptera*, which Mr. Wallace says often display the metallic luster characteristic of the plumage of the New Guinea birds.

The population consists of a great number of isolated tribes, differing much in appearance and language. The level of civilization varies, but seldom reaches even the average Pacific standard.

They have no single name for New Guinea, nor any idea of its extent, only using terms signifying "great land," to distinguish it from the adjacent islands or from Australia.

The name Papúa is a Malayan term signifying frizzled, in reference to the hair; and, as distinguishing the peoples so characterized from the Australians, the term "Papuan" is by some writers thought more suitable than "Melanesian," while equally distinguishing the race from the brown Polynesians. The type of man known as Papuan or Melanesian (see MELANESIA) is found here in its greatest purity, and appears to occupy the whole island excepting its east extremity. But among tribes occupying so wide an area, having little intercommunication, and with other races at no great distance, many deviations from the normal type must be expected, and in fact it is not very easy to define this type. Its leading characteristics are—a medium height; fleshy rather than muscular frame; color a sooty brown, varying, but decidedly darker than the

Malay; high but narrow and rather retreating forehead, with thick brows; nose sometimes flat and wide at the nostrils, but oftener hooked and "Jewish," with depressed point, a feature represented in their karwars or ancestral images; prognathism general, but not universal; lips thick and projecting, so as to make the chin seem retreating; high cheek bones; hair black, frizzly, trained into a mop. The appearance is thus negroid, and is said to resemble the population of the African coast opposite Aden. But in the Arfak mountains in the northwest, and at points on the west and north coasts and adjacent islands, very degraded and stunted tribes are found, with hardly the elements of social organization (possibly the aboriginal race unmixed with foreign elements), and resembling the Aetas or Negritos of the Philippines, and other kindred tribes in the Malay Archipelago. On the banks of the Fly river D'Albertis observed at least two widely differing types, those on its upper course bearing some resemblance to the tribes of the eastern coast. Here, wedged in among the ruder Papuans, who reappear at the extremity of the peninsula, we find a very different-looking people, whom competent observers, arguing from appearance, language, and customs, assert to be a branch of the fair Polynesian race. But there are obvious signs among them of much admixture of blood; and they or their congeners again may easily have modified their neighbors immediately west of them, just as Malay and other influences have done on the other end of the island. Indeed the greater degree of intelligence and good looks observed at points along the north coast may be due simply to this cause. On the west coasts there is a semi-civilization, due to intercourse with Malays and Bughis, who have settled at various points, and carry on the trade with the neighboring islands, in some of which, while the coast population is Malay or mixed, that of the interior is identical with the people of the mainland. On the west coasts Mohammedan teaching has also some civilizing effect. Many of the tribes at this west end of New Guinea are, at all events in war time, head-hunters, and in the mountains cannibals. Cannibalism in fact is practiced here and there throughout New Guinea. The frequent hostility and mistrust of strangers are partly due to slave-hunting raids and ill-treatment by traders, but the different tribes vary much in character. The mountain tribes are usually despised by their coast neighbors as ruder and more destitute of resources, but when more numerous and fiercer, as in the south of west New Guinea, the tables are turned, and the coast people live in perpetual terror of their neighbors, who plunder and enslave them.

NEW HAMPSHIRE, one of the New England States, has an area of 9,336 square miles. Its boundaries are partly natural. On the west it is separated from the State of Vermont by Connecticut river; on the north from the province of Quebec by the natural ridge of the watershed between the St. Lawrence and the streams flowing south to the Atlantic; on the east from Maine by a straight line from Quebec to the source of Salmon river, thence by this river to the ocean, and southeasterly through the middle of the Isles of Shoals; the boundary on the southeast is the Atlantic; and that on the south is a line two and a half miles distant from and parallel to the lower Merrimack, until that river changes its course to due north and south, when the line runs magnetic west to Connecticut river. The general shape of the State is nearly that of a right-angled triangle, having the perpendicular 180 and the hypotenuse 190 miles long. The greatest width is 100 miles, from Chesterfield to the outermost of the Isles of Shoals.

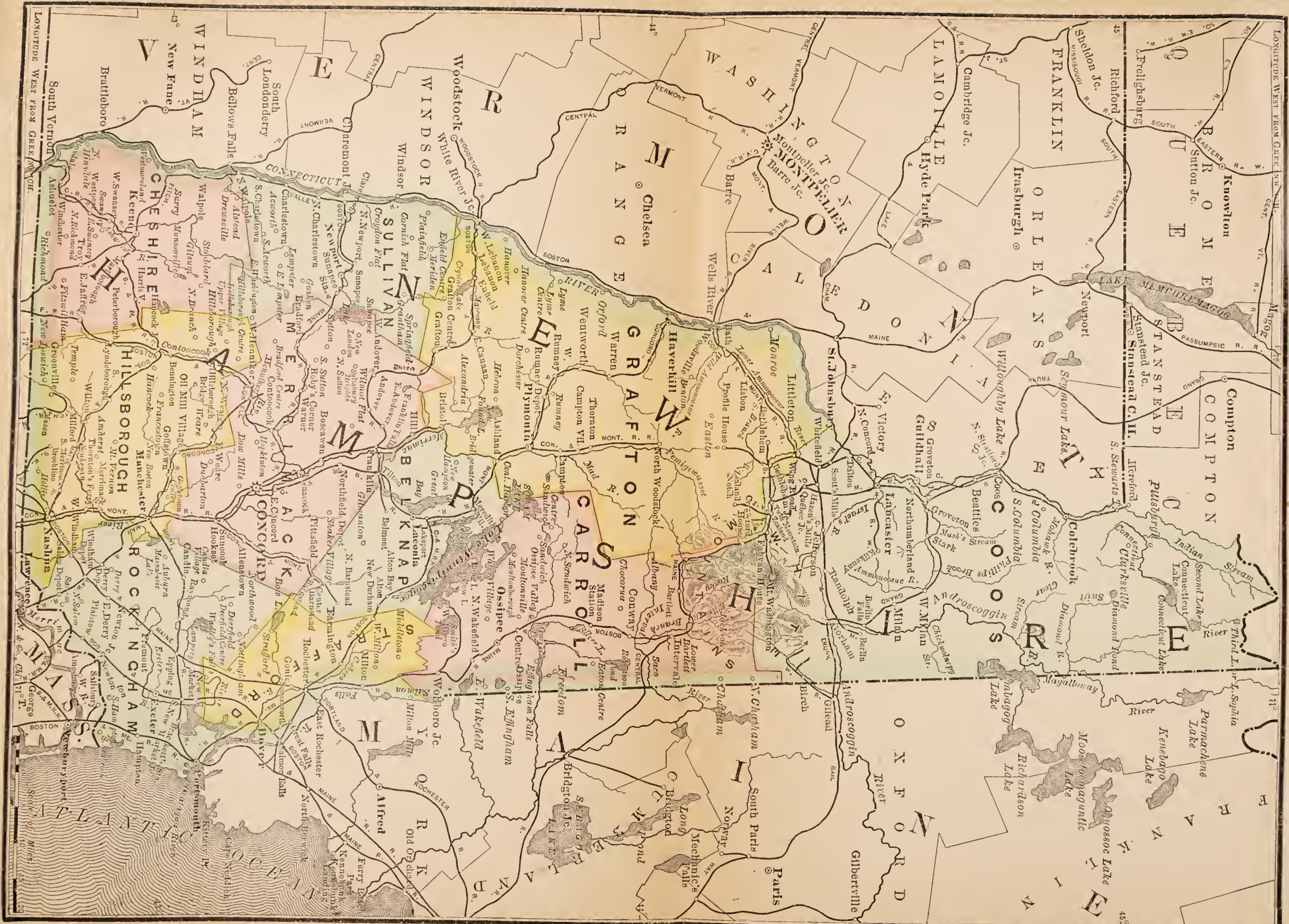
The State lies on the Atlantic slope of the continent, forming part of the elevated belt bordering upon the

ocean which culminates in three mountain districts, viz., Newfoundland, the White Mountains, and the Black Mountains in North Carolina. It is also situated east of the Blue Ridge and its northerly continuation in the New York highlands and the Green Mountain range, both of which are distinct from the true Appalachians—the latter being west of the great Appalachian limestone valley, and well shown in the Catskill, Alleghany, and Cumberland Ridges and plateaus. The Atlantic and White Mountain ranges are comparatively short, consisting of obtusely-pointed summits of gneissic or granitic rocks, either arranged *en échelon* or scattered in irregular groups. The White Mountains group first becomes noticeable in northern Maine, reaching the height of a mile at Mount Katahdin, and continues at less elevation southwesterly to the New Hampshire line, where it rapidly rises to its culmination in Mount Washington (6,293 feet). The part of this mountainous area that lies within New Hampshire extends to about 1,400 square miles. It is continued southwesterly, much reduced in elevation, beyond Mount Moosilauke, along the highlands separating the tributaries of the Merrimack and Connecticut rivers, through New Hampshire and Massachusetts into Connecticut. The distinctive Montalban elevation is limited on the west and on the south by the Connecticut.

The geological reports published in 1878 show four important topographical features: (1) the mountainous ridge following the eastern rim of the Connecticut river basin along the longest straight line that could be drawn within the State; (2) the elevated White Mountain tract, just north of the middle of the territory; (3) the comparatively low country between the two elevated districts just noted and the sea, three-fourths of which, away from the foothills, scarcely exceeds 500 feet above the sea-level; (4) a mountainous district north of the White Mountains, occupying Coos county in New Hampshire, Essex county in Vermont, and an indefinite region in Maine near the Quebec line. The average elevation of the land in New Hampshire is estimated to be 1,200 feet above the sea. Of this more than one-half is situated below 1,000 feet, and about one-sixth exceeds 2,000 feet, and is comprised in the third area mentioned above. The average height of the Coos and Essex district will be found to exceed 1,500 feet. Mount Washington is the only mountain peak exceeding 6,000 feet; and eight others are above 5,000 feet (Adams, Jefferson, Clay, two Monroes, Madison, Lafayette, and Lincoln).

These elevations have produced a marked effect upon the climate and natural products. The greatest annual precipitation is along the Merrimack river, forty-four inches near Manchester and forty-six inches above Franklin. It is only thirty-five inches near the sea-coast, and forty inches on the upper Connecticut. The greatest precipitation is therefore on the seaward side of the long mountainous ridge constituting the backbone of the State. The annual isothermal lines vary from 48° Fahr. at Manchester to 40° in Coos county and 25° upon the summit of Mount Washington.

No less than four faunal areas are recognized, known as the Alleghanian, Canadian, Hudsonian, and Labrador. The first enters New Hampshire from the south, and is limited on the north by the line of 600 feet altitude, which is not far from the isothermal line of 45° Fahr., or the winter average of 20° Fahr. and the summer average of 65° Fahr. A few distinctive animals are the red-headed woodpecker, humming bird, bobolink, Baltimore oriole, blue jay, the box and painted turtles, and the rattlesnake. Among plants which are employed to determine the northern limit of this district are the hickory or shellbark, chestnut, mountain laurel or



Kalmia, grape, and cranberry. A few characteristic animals of the Canadian district are the rose-breasted grosbeak, Canada jay, spruce partridge, crossbill, snow-bird, caribou, and Canada lynx; the absence of reptiles is marked. A few of the trees are spruces, balsam fir, canoe birch, and bush maples. This district, comprising the northernmost county, reaches the height of 4,000 feet, or the upper limit of trees. The Hudson district is a region of dwarfed spruces, extending above the Canadian upper limit to the 5,000 foot line, and limited to the White Mountains. None of the larger animals which flourish about Hudson's Bay could be expected in such limited and mountainous peaks, so that the proof of the presence of this fauna is afforded by the plentiful distribution of the butterfly known as *Brenthinus montinus* and the grasshopper *Pezotettix glacialis*. Owing to the small areas occupied by the Hudson and Labrador floras in the White Mountains, botanists have not yet succeeded in separating the plants peculiar to each. Fifty-three species are referred to them, called the sub-alpine and alpine districts, embracing such genera as *Arenaria*, *Geum*, *Solidago*, *Potentilla*, *Nabalus*, *Cossiope*, *Rhododendron*, *Salix*, *Saxifraga*, *Diapensia*, *Carex*, *Poa*, etc. The Labrador fauna is specially characterized by the abundant presence above the 5,000 foot line of the butterfly *Oeneis Semidea*. The presence of the faunal islands in the midst of the Canadian district is accounted for by the greater coldness of the climate in the glacial period. The whole country was then overspread by the peculiar animals and plants of the arctic regions. As the climate moderated these organisms migrated both northward and upward into the higher districts, where they found the conditions favorable to their existence. Those which ascended the mountainous regions soon became separated from their congeners by the warmer temperature of the lowlands, and are now securely imprisoned in these mountain fastnesses.

New Hampshire was originally nearly covered by a dense forest. In 1876 it was estimated that more than one-fourth of the territory was still covered by trees, not of the original growth, but occupying land that had not been cleared. The trees valued for lumber, growing naturally in the forest, are the red, white, and pitch pines, spruces, hemlock, larch, red and sugar maple, beech, birch, red and white oak, chestnut, elm, hickory, poplar, cherry, etc. The pines have been described by the early settlers as commonly exceeding the height of 200 feet. One that was cut upon the Dartmouth College grounds measured 270 feet in length.

The population of New Hampshire in 1880 was 346,991 (170,526 males, 176,465 females)—46,294 being of foreign birth. The growth of the population is shown by the following table:

	Popula- tion.		Popula- tion.
1790.....	141,885	1840.....	284,574
1800.....	183,858	1850.....	317,976
1810.....	214,460	1860.....	326,073
1820.....	244,042	1870.....	318,300
1830.....	269,328	1880.....	346,991

Census returns (1890) show 376,530.

The decrease in the decade ending with 1870 was due to the effects of the civil war and to the emigration to other States. The latter cause greatly checked the growth of the preceding decade. So constant has it been that 128,505 natives of New Hampshire are resident in other parts of the Union. The density of population is 37.17 to the square mile, but the southern part of the State is more thickly inhabited. The tendency of the population is toward the towns. Of the total

increase in that decade (28,691, of whom 58 per cent. were immigrants), nine towns received 20,649, Manchester alone gaining 9,094. Canada supplied the largest number of immigrants (14,979), and Ireland the next (6,544). Since 1850 the native population has decreased. The number of families in 1880 was 80,286, and the number of births 6,141, one to 56.5 of the inhabitants, and the deaths 5,584. The average size of families was 4.32, the smallest average of any State in the Union, though larger than in a few of the new Territories. It is steadily decreasing.

The principal industry of New Hampshire is manufacturing. The most important manufactures, mentioned in the order of the value of their products, are those of cotton and woolen goods, boots and shoes, leather, lumber, mixed textiles, and worsted goods. Other valuable manufactures are hosiery and knitted goods, paper, foundry and machine-shop products, flouring and grist mill products, and malt liquors. There is a large annual cut of logs in the northern part of the State. The total horse-power employed in manufacturing is about 87,750, of which water furnished 78.81 per cent. and steam 21.19 per cent. Manchester is the chief manufacturing center, but large mills are built at Dover, Nashua, and Great Falls. The growth of manufactures in New Hampshire has been steady and constant. The first cotton-mill was built in 1804. By 1826 there were fifty different buildings for the manufacture of cotton, and about half as many for that of wool. Since 1850 the capital invested in manufacturing has increased nearly 300 per cent., the annual value of materials employed 350 per cent., and the value of products 320 per cent.

The value of the agricultural productions of the State is about one-fifth of the manufactures. The following is the crop report for 1889:

PRODUCTS.	Quantity produced in 1889.	No. of acres in each crop.	Total valuation.
Indian corn.....bushels	1,323,000	38,578	\$912,870
Wheat....."	110,000	10,485	114,400
Rye....."	34,000	3,179	28,560
Oats....."	965,000	33,749	414,950
Barley....."	85,000	3,857	58,650
Buckwheat...."	71,000	4,880	39,760
Potatoes....."	1,216,000	28,956	1,033,600
Hay..... tons	754,069	685,517	7,917,725
Total.....		809,201	\$10,520,515

Minerals occurring in sufficiently large quantities to be the object of mining are gold, silver, copper, zinc, lead, arsenic, tin, iron, bismuth, manganese, and molybdenum. Articles used for building purposes occurring largely are granite, colored porphyries for ornamentation, slate, clays for brick, limestone, and soapstone or steatite. Other useful minerals either obtained directly from the rock or capable of special manufacture are quartz and felspar for glass, mica, plumbago, precious stones, whetstones, copperas, alum, pyrites, titanium, polishing powder, molding sand, and ochers for paints. There are forty extensive quarries of granite in the State. The stone is very fine grained, of a light gray color, and is used largely for obelisks in cemeteries. The mineral beryl is very abundant. Crystals weighing 2,900 pounds have been described as occurring at Grafton.

The first railroad charter was granted in 1735. Since then the growth of railroads has kept pace with the development of the State, the present mileage (1079) being greater in proportion to population and wealth than in the case of any other New England State. The Mount Washington Railway is one of the triumphs of modern

engineering. Extending two and three-quarters miles from the base to the summit of Mount Washington, it makes an ascent of 3,625 feet. Its maximum gradient is 1,980 feet to the mile, and the sharpest curve has a radius of 497 feet. The peculiarity is a central cog-rail into which plays the cog-driver of the engine, while the weight rests upon two lateral rails.

The first bank in New Hampshire was established at Portsmouth in 1792. In 1890 there were in the State fifty National and other banks with a capital of over \$7,000,000. The first savings bank was established in 1823. They now number sixty-five. Every banking company pays annually to the State a tax of $\frac{1}{2}$ per cent. on its actual capital, and the amount thus paid constitutes a "literary fund" for the support of schools. All are under the supervision of two bank commissioners, whose duty it is to inspect the accounts and securities of each bank at least once each year, and who have power to petition the supreme court against any bank which they think unsound. Total funded debt of State June 1, 1890, \$2,481,453. Valuation for 1888 \$252,570,803.50; tax, \$400,000; gross revenue, 1889-90, \$639,492.97, and gross expenditures, \$488,629.24; debt of counties, \$495,175. Population, 376,530. Valuation per capita, \$668.18. Tax per capita, \$1.06.

The State constitution, adopted in 1784, contained a clause, still in force, making it the duty of "legislators and magistrates to cherish the interests of literature and the sciences, and all seminaries and public schools." In 1789 the school laws were revised, and towns required to raise for school purposes \$20 for every \$5 of their several apportionments of the State tax. This requisition has been gradually increased, until now it is \$350 for each dollar of the apportionment. In 1805 the towns were authorized to divide into districts, and each district was directed to maintain a school. This system, with modifications, is still in force. Towns are now authorized to abolish districts and form central schools, and to grade them when the attendance exceeds fifty. High schools may be established when there are not less than 100 school children between the ages of six and sixteen. In 1829 the "literary fund" was divided among the towns according to the apportionment of the State tax for the support of "common free schools, or for other purposes of education." To the tax on bank capital is added one on the savings banks deposits of non-residents. The general supervision and control of the educational interests of the State are committed to a superintendent of public instruction appointed by the governor. The immediate charge of all schools is given to local boards of education or committees, which, within the requirements of the law, have complete authority to engage teachers and fix their compensation, to regulate the studies and discipline of the schools, and to direct their expenditures. Attendance upon the public school or some reputable private day school for at least twelve weeks in a year is required, except in cases of sickness, of all children between the ages of eight and fourteen. In 1890 there were 2,032 public schools, with 59,183 scholars enrolled and 41,526 in actual attendance, and 3,114 teachers. The number of school-houses was 2,078; value of school property \$2,578,257. Nearly \$700,000 was raised by town and district taxes for the schools. The schools are supported by the literary fund, the tax required by law, with the additional taxes voted by the towns and a few other taxes. There are also, existing under special charters, fifty-three academies and seminaries, many of them endowed, and furnishing a preparatory training for college. The largest of these is Phillips Academy at Exeter, founded in 1781. Dartmouth College, the only college in the State, was founded in 1769. It has nearly 7,000

graduates, among whom are some of the most noted names in American history. With its academic course are connected a scientific department, a department of civil engineering, the New Hampshire Medical College, and the New Hampshire College of Agriculture and the Mechanic Arts.

The executive department consists of a governor and five councilors elected biennially by a majority vote, or by the general court when there is no popular election. In addition to the usual powers of the executive, the governor and council have the right of pardon, and appoint all judicial officers, the attorney-general, notaries, coroners, judges of probate, and general and field officers of the militia. The legislative department consists of a senate of 24 members, elected by districts, and a house of representatives of 231 members, elected by the towns according to population. They are styled the General Court, and meet biennially in June. The judicial department is a supreme court consisting of a chief justice and six associate justices appointed by the governor, and holding office during good behavior, or till they reach the age of seventy. Law terms are held twice each year at the capital, by the full bench, and by single justices two or four times yearly in each of the ten counties. This court has civil, criminal and equity jurisdiction. Exceptions on questions of law, taken at the trial terms, are heard at the law terms, and cases not exceeding \$100 in value, or affecting the title to real estate, may be tried before referees without jury. Commitments for offenses are made by justices of the peace and by police courts. Probate courts are held by the judges of probate in the different counties, but there is a right of appeal to the supreme court. All native or naturalized male inhabitants of the State, except paupers, are entitled to vote. The State is represented in Congress by two senators and two representatives, and has four votes in the electoral college.

New Hampshire was unknown to the earliest European explorers of America, who passed its short seacoast without observation. The first recorded visit of a white man was that of Martin Ping, who, in June, 1603, sailed with two small ships into the Piscataqua. The French discoverer De Champlain visited it in July, 1605, and discovered the Isles of Shoals, but in 1614 Capt. John Smith made a more careful examination of this and the contiguous coast. The map which he made was presented to Prince Charles of England, who gave the whole country the name of New England. In November, 1620, James I. chartered the Plymouth Company "for the planting, ruling, ordering, and governing of New England," which was the territory lying between the 34th and 48th parallels of north latitude. On August 1, 1622, this company gave a sub-charter to Sir Fernando Gorges and Capt. John Mason of all land lying between the Merrimack and Kennebec rivers and a line supposably sixty miles inland. This was called "Maine," though from another charter covering about the same territory sometimes spoken of as "Laconia." Under this charter settlements were made in 1623 at the places now known as Portsmouth and Dover, by companies sent out by Mason and Gorges. These continued for several years without enlargement, mere fishing and trading posts; and the next settlements, those at Exeter and Hampton, were not made till 1638 and 1639. In November, 1629, Gorges and Mason divided their grant, and Mason obtained from the Plymouth Company, of which he was then a member, a grant of the land between the Merrimack and the Piscataqua for sixty miles inland. To this tract he gave the name of New Hampshire, from the county of Hampshire, in which he had been a resident. The efforts of Mason, his heirs and assigns, to enforce the proprietary rights of

this patent, gave rise to litigation that lasted more than a century and a half. The settlers disturbed in their possession resisted his claim, opposing to it the rights of occupancy and a prior deed of a considerable portion of the same land, said to have been obtained of four Indian sagamores in May, 1629, by one Wheelwright, a minister expelled from Boston for errors of doctrine. This deed was probably a forgery, but it was made the basis of resistance to Mason's grant. Cases arising from the conflict of the two deeds were repeatedly brought before the colonial courts and appealed to England. Conflicting decisions, resisted when adverse to those in possession, delayed settlement till 1746, when a company purchased the Mason claims, and by refraining from the extreme assertion of their claims brought the quarrel nearly to an end, but it did not wholly disappear till it was settled by the legislature in 1787. In 1641 the four New Hampshire settlements, fearful of their weakness, voluntarily petitioned for union with Massachusetts. They were received, and with some towns on the Merrimack formed into a county. This union continued till 1680, when the claim which Massachusetts had put forward for jurisdiction over New Hampshire, by the terms of its charter, was denied by royal authority, and New Hampshire was declared a separate province, with a governor of its own. The province ceased to have a special governor when Joseph Dudley was appointed governor of New England in 1685. In 1691, when Massachusetts regained the charter of which it had been deprived, New Hampshire was anxious to unite with it, and did act with it for a time. It did not, however, cease to be a royal province until the Revolution, having governors of its own, or jointly with Massachusetts and all New England. New Hampshire suffered severely in the French and Indian wars, as its settlements were most exposed to the attacks that came from Canada. It furnished 500 men for the siege of Louisbourg in 1745, of whom 150 were paid by Massachusetts. It sent 500 to the attack on Crown Point in 1755, and raised 2,600 in the succeeding years of the war. The boundaries of New Hampshire, owing to conflicting charters given in ignorance of the country, were long a matter of dispute. The claim of Massachusetts to its whole territory was not settled, and the southern boundary definitely established, till 1740. In 1749 a controversy arose with New York, which claimed as far east as the Connecticut river, while New Hampshire claimed to extend as far west as did Massachusetts. It was determined in favor of New York in 1764, but not till New Hampshire had chartered 138 towns in the disputed territory. After the Revolution many of these towns attempted to unite with those on the western border of New Hampshire into a new State. The bitter quarrel that arose and proceeded almost to bloodshed was settled only by the interposition of Congress. The settlement of New Hampshire, which had been retarded by fears of Indian invasions and questions of jurisdiction, followed very rapidly after the province was quieted, so that by the outbreak of the Revolution it had 80,000 inhabitants. It took a prominent place in the assertion of American liberty. It was represented in the successive Continental Congresses by two delegates, who in 1776 subscribed the Declaration of Independence, and, in 1787, contributed to the formation of the constitution. Two New Hampshire regiments took part in the battle of Bunker Hill. The battle of Bennington, that turned the scale of the war, was won by New Hampshire and Vermont troops under the command of General Stark, who bore a commission from New Hampshire. In the whole war New Hampshire furnished 12,497 soldiers. It was the ninth State to adopt the Federal constitution,

June 21, 1788, thus securing the success of the Union. Its own provisional government, formed on the retirement of the royal governor in 1775, was replaced by a State constitution in 1784. This was thoroughly revised in 1792, and with minor changes continued till 1877, when another, though less radical, revision was made. In the war of 1812 the State, though divided on the question of the rights of the States and the general government, sent its quota of men. More than 2,000 took part in the various battles. In the civil war of 1861-65 New Hampshire earnestly supported the Union cause. It furnished eighteen regiments of infantry, one of cavalry, one light and one heavy battery, and three companies of sharpshooters, in all 32,750 men, or about 10 per cent. of the population.

NEWHAVEN (anciently MEECHING), a seaport of Sussex, is situated on the English Channel, near the mouth of the Ouse, and on a branch of the London, Brighton and South Coast Railway, fifty-six miles south from London, six and a half miles south of Lewes, and eight and a half east of Brighton.

NEW HAVEN, a city and town of New Haven county, Conn. (local time sixteen minutes before that of Washington), is widely known as the seat of Yale College. The town includes the city and two outlying suburbs—Westville and Fair Haven East. The city occupies an alluvial plain, from three to four miles in breadth, at the head of New Haven harbor, which is an indentation of the northern shore of Long Island Sound, extending inland about four miles, and formed by the confluence of three small rivers flowing through the township; the plain is partly inclosed on the east and west by two prominent trap rocks, with precipitous faces toward the city, respectively 360 and 400 feet in height. The mean annual temperature is 49° Fahr.; and the city ranks among the healthiest in the United States. It is seventy-four miles northeast from New York, with which it is connected by rail, as well as by daily steamboats; it has communication by three railway lines with Boston, 120 miles to the northeast, and two other railways have their termini here.

The central and older portion of the city is laid out in regular squares, surrounding a public green of sixteen acres, on which stand the three oldest churches and a building formerly used as a State-house; the abundance and beauty of the elms planted about this square and along many of the streets has caused the place to be familiarly known as the "Elm City." On the squares bordering upon this central park are the interesting grounds and buildings of Yale College, the city hall and county court-house, the postoffice and custom-house, and several churches. The college buildings include six dormitories for the undergraduate academical department, and there are thirteen buildings for recitation-rooms, laboratories, museums, library, etc. The handsome buildings of the theological department are in the immediate vicinity. Other public buildings are the general hospital and training school for nurses, an armory, the orphan asylum, the almshouse, the county prison, the halls of the Sheffield Scientific School, the college observatory, and the Connecticut Agricultural Experiment Station. The finest private residences are in the section of the city north of the central square. There are ten smaller squares within the town limits, and two private parks, of fifty-five and thirty acres respectively, the smaller being the college athletic grounds. A beautiful park of 352 acres (partly in an adjoining town) was opened in 1881; it lies two miles to the northeast of the city green. The public buildings include sixty-one places of worship, of which nineteen belong to the Congregationalists, the only denomination in the town for a century after its settlement; twelve to the Method-

ists, first organized here in 1795; eleven to the Protestant Episcopal Church, first organized about 1736; seven to the Baptists, who formed a church here in 1816; and seven to the Roman Catholics, whose first church was erected in 1834. There are thirty-six public schools. Twenty-nine schoolhouses owned by the town, with their furniture and grounds, represent an outlay of about \$675,000. There are also about twenty private schools, the oldest being the Hopkins Grammar School, founded in 1660.

The harbor, which originally determined the site of the city, and has always been a large factor in its prosperity, is large and safe, though shallow, and is under improvement by the construction of a costly breakwater. Long Wharf, begun in 1682, is 3,480 feet in length, the longest pier in the United States. Natural oyster-beds formerly abounded in the harbor and its tributary streams; and extensive beds are still maintained by planting, which give large returns, and make New Haven the chief center of the important oyster trade of Connecticut. The harbor is still more valuable in its relation to the extensive manufacturing industries of the vicinity. Within a radius of twenty miles not less than \$50,000,000 is employed in the manufacture of hardware, carriages, arms, and wire. For this New Haven is the commercial center, and through its port there annually passes merchandise (largely coal and iron) valued at \$175,000,000. The foreign trade is chiefly with the West India Islands and Demerara, and its prosperity dates from the latter part of the eighteenth century.

In the production of carriages and carriage trimmings, New Haven, which is the chief seat of the trade in New England, employs a capital of perhaps \$1,250,000; nearly 2,000 workmen receive annual wages of about \$750,000; and the estimated value of the yearly product is \$2,240,000. Another important industry is represented by the Winchester Repeating Arms Company, which, with a capital of \$1,000,000, employs 1,200 hands, and does a business in sporting guns and ammunition of about \$2,500,000 a year. Another noticeable manufacture is that of superior blotting paper from cotton waste; blotting paper was made here for the first time in America in 1856. The other principal manufactures are locks, rubber, clocks, organs, corsets, fish-lines, and paper boxes. There are nine banks of deposit, with an aggregate capital of \$4,664,000, and a circulation of \$3,038,940; also three savings banks, with deposits of about \$9,000,000. About \$225,000 is annually paid in New Haven in fire insurance premiums, for the protection of property valued at upward of \$25,000,000.

New Haven (Indian name Quinnipiac, meaning "long-water land") was settled in 1638 by nearly three hundred English emigrants of more than the average wealth and business ability, led by John Davenport and Theophilus Eaton, with the design of founding a commercial colony to be governed by the laws of the Bible. Davenport, an Oxford graduate, and for fourteen years a minister in London, became the pastor of the New Haven church; and Eaton, a successful London merchant, was the first governor of the colony which grew up about the town. The colony (of the same name) included five other towns, and remained independent until merged, by a charter of Charles II., in 1662, in the older colony of Connecticut; this result was largely due to the waning prosperity of New Haven (in contrast with Connecticut), and to the prejudice against its more rigidly Puritan tone, as shown, for instance, in its code of laws, and in such incidents as the shelter given to Whalley and Goffe, two of the regicide judges. In recognition of its former standing,

the sessions of the legislature were held alternately here and in Hartford (the original capital of Connecticut) from 1701 to 1784. From the original territory of the town (about thirteen by eighteen miles) ten new towns have been wholly or partly taken. New Haven was from the beginning distinguished for its care of public education—a free school being ordered to be set up as early as 1641, and the establishment of a college being contemplated in 1648. In 1710 Yale College was removed from Saybrook to New Haven, which had then somewhat under a thousand inhabitants. A period of quiet and regular growth ensued. In 1754 a printing press was set up, and in 1755 the first newspaper published in Connecticut appeared here. There are now six daily and six weekly papers, besides several college periodicals, *The American Journal of Science*, founded in 1818 by Professor Silliman, and another review (*The New Englander*). The Connecticut Academy of Arts and Sciences, incorporated in 1799, and the American Oriental Society, have their libraries here, and publish valuable transactions. In the American Revolution the town favored resistance to the British Government, and in 1779 was invaded by a detachment of about 3,000 British troops, under General Tryon. In 1784 New Haven received a city charter (the earliest in the State), the territory incorporated having then a population of about 3,350. With the close of the Revolutionary War commerce revived and expanded; and after the war of 1812 manufactures were introduced.

The population numbered, in 1790, 4,510; in 1800, 5,157; in 1810, 6,967; in 1820, 8,327; in 1830, 10,678; in 1840, 14,396; in 1850, 22,529; in 1860, 39,267; in 1870, 50,840; in 1880, 62,882; and 81,298 in 1890. The receipts of the city treasury for 1889 were \$611,176.93; expenditure, \$709,820.20; funded debt, \$974,000. Rate of taxation, 11½ cents. The city maintains a police department at a cost of \$118,000, and a fire department at a cost of \$85,000. The city is divided into twelve wards, and is governed by a mayor and twenty-four aldermen (twelve elected yearly) and thirty-six councilmen.

NEW HEBRIDES AND SANTA CRUZ. These islands form part of the long chain of groups in the west Pacific known as the MELANESIA (*q.v.*), having the Solomon Islands about 200 miles west and northwest of their northern and New Caledonia at the same distance west of their southern extremity. They extend for about 700 miles, the Santa Cruz group lying about 100 miles north of the New Hebrides. Excepting the small Torres group in the North New Hebrides, and some other small islands north of Santa Cruz which are all perched on reefs, but without lagoons, all the islands are of volcanic formation, the larger ones lying on both sides of the line of volcanic activity. The largest of them, being thought by its discoverer, Quiros (1606), to be the long-sought Terra Australis, was named by him Australia del Espiritu Santo. It is seventy-five by forty miles; its peaks and mountains have a fine appearance from the sea. Southeast from Espiritu Santo lie Mallicolo (fifty-six by twenty miles), with a fine harbor, and Ambrym (twenty-two by seventeen miles), very beautiful, with a great volcano, 2,800 feet; south of this Lopevi, a perfect volcanic cone, also active, rises to 5,000 feet. Farther south are Vaté or Sandwich Island (thirty by fifteen miles), with the very fine harbor of Havannah; Erromango (thirty by twenty-two miles; 3,000 feet), where sandalwood is still found; Tanna (eighteen by ten miles), containing Yasowa, the largest volcano of the group; and Aneiteum, the most southerly (2,788 feet). Sulphur from the volcanoes is exported. Santa Cruz or Nitendi Island was the scene of Mendaña's ill-fated attempt, in 1595, to found a col-

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ony; and on Vanikoro, south of Santa Cruz, La Pérouse's expedition was lost (1788). Except in the two localities above mentioned, and at Aneiteum, the coasts are almost free from reefs (the subterranean heat being probably fatal to zoöphyte life), and the shores rise abruptly from deep water, the hills being densely wooded, and the scenery and vegetation singularly varied and beautiful. The trees—*Casuarina*, candle-nut (*Aleurites triloba*), kaurie pine (on Tanna), various species of *Ficus*, *Myrtaceæ*, and many others—are magnificent; the cocoa-nut is not confined to the coast, but grows high up the valleys on the hill-sides. Beautiful crotons and dracænas abound. Besides the bread-fruit, sago-palm, banana, sugar, yam, taro, arrowroot, and several forest fruits, the orange, pine-apple, and other imported species flourish; and European vegetables are exported to Sydney. The fibers of various *Urticeæ* and *Malvaceæ* are used.

No land mammals are known except the rat and *Pteropidæ*. Birds (species) are less numerous than in the Solomon Islands. Pigeons, parrots, ducks, and swallows are common, and a *Megapodius* is found. Of fish more than one hundred kinds are known, mostly inferior as food, and some poisonous. Whales and bêche-de-mer abound and are fished for. There are two kinds of serpents (harmless), three or four lizards, and two turtles; locusts, grasshoppers, butterflies, and hornets are numerous. The population is perhaps 50,000.

NEW IRELAND. See NEW BRITAIN.

NEW JERSEY. The State of New Jersey, one of the original colonies which formed the United States of America, is bounded on the east by the Hudson river, Staten Island Sound, Raritan Bay, and the Atlantic Ocean, on the south by Delaware Bay, on the west by the Delaware river, and on the north by the State of New York, their common boundary being a straight line from the west bank of the Hudson river in latitude 40° north to a point on the north bank of the Neversink river at its junction with the Delaware. The extreme length is 167 $\frac{3}{4}$ miles, and the width ranges from 59 to 32 miles; and the State has an area of 7,576 square miles, and is divided into 21 counties and 223 townships.

New Jersey lies entirely on the Atlantic slope of the United States. In the north and northwest it is traversed by the Appalachian chain; the Red Sandstone belt, intersected by trap dykes, and extending from Massachusetts to South Carolina, occupies the central portion; and the lower half of the State is a part of the level sandy tract, covered with pine woods, which borders the Atlantic from New York to Florida.

The ridges of the Appalachian chain in New Jersey may be grouped in two main ranges—the Blue or Kittatinny Mountains and the Highland range. The first of these is an almost unbroken ridge from the New York State line to the Delaware Water Gap, and is the highest ground in the State, being at the Water Gap 1,479 feet above the sea, and at High Point, near the New York line, 1,800 feet high. Its level crest is clothed with forests, but the slopes are to a great extent cultivated. The Highland range, on the other hand, consists of a number of detached ridges, the highest of which is 1,488 feet above the sea. These vary greatly in their surfaces; many admit of cultivation to the summit, while others are so covered with loose stones or bare rock that cultivation is impossible. The mineral wealth of the range is considerable. The southern half of the State is a great plain, containing tracts of gravelly loam largely used for market gardens and vineyards. Extensive tidal marshes border the Atlantic and Delaware Bay, to the extent of nearly

300,000 acres. The Delaware river and bay receive all streams flowing from the western half of the State; the Passaic and Raritan are the most considerable rivers entirely within New Jersey. In the northwestern part are many beautiful lakes abounding with fish; the largest is Lake Hopatcong, five and one-half miles long by four and one-third to one and one-quarter miles wide.

The entire seacoast is rapidly becoming a continuous line of summer resorts, among which may be enumerated Long Branch, Sea Bright, Spring Lake, and Asbury Park in the northern portion, Atlantic City in the center, and Cape May in the south. Some of these places, as Atlantic City, are frequented even during winter months.

Although, according to the census of 1880, only the thirty-fifth among the thirty-eight States in area, it was the nineteenth in population, the eighth in the value of property, and twenty-fifth in value of agricultural products, the sixth in manufacturing and mechanical industries, while in some industries, as silk, pottery, and glass, it far exceeds any other State. The output of the non-precious minerals places it seventh in the list of States, it being the fourth among the iron-producing States, and first as to zinc ore. It has 1,981 miles of railways, or one mile to every four square miles of area, exceeded in this by only one State. The average value of farming lands is considerably above that of any other State.

The following is the crop report for 1889:

PRODUCTS.		Acres.	Value.
Indian corn.....bushels	10,406,000	346,866	\$5,723,300
Wheat..... "	1,459,000	143,083	1,269,330
Rye..... "	994,000	123,518	576,520
Oats..... "	3,221,000	138,830	1,159,560
Buckwheat..... "	426,000	36,034	251,340
Potatoes..... "	2,767,000	41,301	2,019,910
Hay.....tons	616,989	493,591	7,798,741
Total.....		1,303,273	18,798,701

Omitting fishery products, gas, petroleum, refining, mining, and quarrying, the following table gives the general condition of the manufacturing interests of the State in the years mentioned:

	No. of Establishments	Capital.	Hands Employed	Wages Paid.	Cost of Material.	Products.
1850	4,207	\$22,293,258	37,830	\$9,364,740	\$22,011,871	\$39,851,256
1860	4,173	40,521,048	56,027	16,277,337	41,429,100	76,306,104
1870	6,636	79,606,719	75,552	32,648,409	103,415,245	169,237,732
1880	7,128	106,226,038	126,038	45,083,045	165,280,179	254,375,236

The population of the State was 211,140 in 1800; 277,426 in 1820. 373,306 in 1840; 672,035 in 1860; 906,096 in 1870, and 1,131,116 in 1880. The census of 1880 showed 559,922 males and 571,194 females; 1,092,017 white, 38,853 colored, 172 Chinese, and 74 Indians. The inhabitants of foreign birth numbered 221,700. To every square mile of area there were 151.73 inhabitants, the State being the third in the Union in respect of density of population. In 1890 the population as shown by the United States census was 1,444,933.

The largest cities are Newark, Jersey City, Paterson, Camden, Hoboken, Trenton (the State capital), Elizabeth, New Brunswick, Orange.

The executive power is vested in a governor elected by the people for a term of three years; no one can serve in this capacity two successive terms. The legislative power is in the legislature, composed of a senate and general assembly meeting on the second Tuesday of January each year at Trenton, the capital of the State.

A senator is elected for three years by each of the twenty-one counties, one-third of the whole number being elected each year. The assembly consists of not more than sixty members, elected for one year, and apportioned among the counties as nearly as may be according to the number of their inhabitants, with the condition, however, that each county shall at all times be entitled to one member. The principal officers of the State are a secretary of state, attorney-general, adjutant-general, and quartermaster-general, all appointed by the governor and confirmed by the senate, and a treasurer and comptroller appointed by the legislature in joint meeting. All judges and prosecutors of the pleas are appointed by the governor and confirmed by the senate; the election system for the judiciary has not yet reached New Jersey.

The judicial power is vested in (1) a court of errors and appeals in the last resort, consisting of the chancellor, the justices of the supreme court, and six judges of the court of errors; (2) a court for the trial of impeachments, consisting of the senate; (3) a court of chancery, consisting of the chancellor and two vice-chancellors; (4) a supreme court, consisting of the chief justice and eight associate justices; (5) circuit courts, held in every county by the justices of the supreme court; (6) an inferior court of the common pleas organized in each county, and consisting of three judges. In some of the sparsely settled counties the inferior courts are presided over by justices of the supreme court; in the other counties one of the three judges is a law judge and presides. The court of pardon consists of the governor, the chancellor, and the six lay judges of the court of errors; a majority of this court, of whom the governor must be one, can remit fines and forfeitures, and grant pardons, after conviction, in all cases except impeachments.

Among the most important interests are those given in the following table:

KIND OF INDUSTRY.	Capital.	Average yearly Products.
Anthracite furnaces.....	\$6,825,000	\$3,580,664
Boots and shoes.....	1,153,390	5,262,671
Breweries.....	4,250,000	5,798,330
Cotton goods.....	3,961,145	5,039,519
Drugs and chemicals.....	8,830,750	4,993,965
Foundry and machine-shop products	7,431,421	11,282,748
Hats and caps.....	1,343,900	6,152,447
Iron and steel.....	9,741,216	11,837,846
Jewelry.....	2,555,899	4,079,677
Leather.....	3,793,796	15,475,222
Paper-mills.....	1,830,500	2,015,569
Rubber goods.....	1,790,200	5,212,695
Sewing-machines.....	1,152,755	4,640,852
Silk and silk goods.....	6,952,325	17,122,236
Stone and earthenware....	2,057,200	2,598,757
Sugar and molasses.....	2,110,000	22,841,258
Woolen goods.....	2,530,125	4,984,007

There are two lunatic asylums—one near Trenton, the other near Morristown; the latter is probably unsurpassed by any similar institution; there are also seven county asylums. An institution for the deaf and dumb has been established at Trenton; the blind and feeble-minded are placed in suitable establishments. The home for disabled soldiers, at Newark, accommodates nearly 400 men. The State expended for charities in 1890, \$362,641.95. The State prison at Trenton contains on an average some 800 convicts, a large part of whom are employed in contract labor to an extent which pays about 54 per cent. of the cost of the institution. A reformatory school for boys is situated near Jamesburg. An industrial school for girls, near Trenton, has forty-seven inmates. The board of health is steadily gaining in importance, and has accomplished much good

in spreading useful information, collecting important vital and health statistics, and investigating matters affecting the public health. The labor bureau has done good service in collecting statistics affecting the questions of labor and capital, in bringing about a better understanding between the two, and in indicating new and profitable avenues for industry. The geological survey, of which the geodetic and topographical surveys have necessarily formed part, now approaching its close, is one of the most useful of the State institutions.

The Agricultural College, attached to Rutgers College at New Brunswick, is supported by the proceeds of certain public lands given by the United States to the State for that purpose. In connection with this are the college farm and the agricultural experiment stations, which are doing admirable work in systematic and carefully conducted experiments (under the chief of the geological survey) with various fertilizers, and in testing various soils, crops, and methods of agriculture. The public schools are mainly supported by a State tax, supplemented by an annual appropriation of \$100,000 from the school fund. Small additional special taxes are also levied in some of the school districts. A normal school has been in successful operation at Trenton for several years, and has a large number of pupils. The college of New Jersey at Princeton, and its sister theological seminary, although not State institutions, occupy places in the very front rank of American schools of learning. The State Library at Trenton contains 36,000 volumes.

Total debt, \$1,096,300; annual charge, \$68,778. The debt is payable \$100,000 yearly. Valuation, \$649,979,700. Valuation, per capita, \$441.29. Gross receipts, year ending November 1, 1890, \$2,036,694; expenditures, \$1,602,933. Balance on hand October 31, 1890, \$433,760.

The first settlement within the present State was made in 1617 by the Dutch at Bergen, opposite New York. Subsequently, Cornelius May, who discovered the Delaware in 1623, built a fort on its banks opposite Philadelphia. During the early colonial period the region was the scene of many petty struggles arising out of the rival efforts of the Dutch, Swedes, and English to establish trading posts and settlements on the river. The Indians among whom these early settlers were thrown were generally divided into small tribes; but in the valley of the upper Delaware were the principal and most populous seats of the Leni Lenape—known by the English as the Delawares, a name still retained by the remnants of this most interesting and once powerful tribe in their new homes west of the Mississippi. On the whole the early intercourse between the whites and Indians was peaceful, but there were occasional collisions, some of a serious nature, too often brought about by the rapacity and bad faith of the whites. As a rule the title to the Indian lands was purchased, and after the province fell into the hands of the English the general policy pursued was one of humanity and good faith. At the time of the English accession it is estimated that the Indians in New Jersey numbered about 2,000.

When Charles II. wrested their North American possessions from the Dutch—in fact before this was accomplished—he granted them in bulk to his brother, the duke of York, who in turn granted what is now New Jersey to Lord John Berkeley and Sir George Carteret, the conveyance (June 23, 1664) providing that “the said tract of land is to be called Nova Cæsarea, or New Jersey.” The royal grant was of the proprietary character, that is, it not only conveyed the absolute estate and title to the land, but also the power to govern and rule, and therefore to establish such laws as “might be thought necessary, provided they were not

contrary to, but as near as conveniently might be, agreeable to the laws, statutes, and government of the realm of England." As all these rights and powers were assignable, the duke transferred to Berkeley and Carteret, not only the lands, but also the power to govern; and they in turn possessed, and finally exercised, the power to assign to others both land and power to govern. A form of government was accordingly established in a "concession and agreement" issued by them. The governor was appointed by the proprietors, and he appointed a council of from six to twelve members; the governor and council united formed the executive. The freeholders of the province elected not less than twelve representatives, who, with the governor and council, composed the general assembly, in whom rested the legislative power, limited only by the terms of the "concession," especially the article securing entire liberty of conscience. The general assembly established the courts of justice, and took all measures necessary to preserve order and provide for the general defense; they regulated commerce, and determined the time and duration of their own sessions; they possessed the entire power of taxation, and it was required that the executive should neither impose nor suffer to be imposed any tax other than those imposed by the general assembly. The right of petition to the lords proprietors was secured to the freeholders. The first governor was Philip Carteret, a brother of Sir George, who arrived with a number of "adventurers" in August, 1665, and established himself at Elizabethtown. Upon the capture of New Amsterdam by the English, their commander, Colonel Nichols, assumed the administration of the entire territory in the name of the duke of York. Ignorant of the grant to Berkeley and Carteret, Nichols at once offered inducements to settlers from New England and Long Island to move into New Jersey, advising them to purchase the Indian titles, and promising immunity from ground rents. In consequence of this promise, which occurred before Carteret's arrival, serious difficulties afterward arose.

The first general assembly met at Elizabeth, May 26, 1668; another session was held during the same year, but none other for seven years thereafter. In 1672 New Amsterdam and New Jersey were reconquered by the Dutch, but early in 1673 they reverted to England. Doubts arising as to the effect of the reconquest upon the validity of the original grant, the duke of York obtained a new grant from the king, and renewed his own to Berkeley and Carteret. Prior to this renewal the two proprietors had agreed to a division of their interests, and in the new grant the portion assigned to Carteret was the region east of a line drawn from Barnegat Creek to the Rancocas; to Berkeley was assigned the territory west of that line. In 1676, however, the line of separation was changed by the owners, so that it extended from Little Egg Harbor to a point on the Delaware in 40° N. latitude; this remained thereafter the boundary between East and West Jersey.

Immediately after the reconquest Philip Carteret returned to East Jersey as its governor, and on his arrival in 1674 presented a new charter, less liberal in many respects than the original. Berkeley meanwhile sold West Jersey to a firm of Quakers, who at once proceeded to colonize it, establishing their first settlement at Salem in 1675, and another shortly after at Burlington. For some years great annoyance was experienced in both East and West Jersey from the unjust interference of the governor of New York, and of the duke himself, with their internal affairs; these attempts were always met by a firm and spirited resistance, which eventually triumphed. In 1682, soon after Sir George

Carteret's death, a society of Quakers under the lead of William Penn, encouraged by their success in West Jersey, purchased from his heirs their rights to East Jersey. It will give some idea of the progress already made to state that at this early period (1682) a smelting furnace and forge were in operation in New Jersey, making good iron, and that contemporary documents show that at the same date there were exported "great plenty of horses, beef, pork, pipe-staves, boards, bread, flour, wheat, barley, rye, Indian corn, butter, and cheese to Barbados, Jamaica, and other adjacent islands, as also to Portugal, Spain, the Canaries, etc.; whale oil, whale fins, beaver, mink, raccoon, and martin furs to England."

Toward the close of the seventeenth century the number of proprietors in the two provinces increased so much as to render good government impracticable in consequence of the discord arising from divergent interests and views. The evil became unendurable, and in 1702, by the general consent of the proprietors and people, the former, while retaining all their property rights, surrendered their right of government to the crown, by whom the two provinces were reunited, and placed under a governor appointed by the sovereign. With him were associated in the government twelve councilors selected by the crown, and twenty-four assemblymen selected by the freeholders. The sessions of the assembly were at the pleasure of the governor, and its acts subject to the double veto of governor and crown. The governor and council organized the courts of law, determined all salaries, and appointed all civil and military officers.

The population of the two provinces at this period was probably a little more than 15,000. The great majority of the people were Quakers, Presbyterians, and Anabaptists; there were only two Church of England ministers in the province, and their followers were too few and poor to provide churches; nevertheless the Church of England was now made the established church, and its support provided for. Liberty of conscience was permitted to all except Roman Catholics. Quakers were eligible to office. The governor enjoyed the right of presentation to ecclesiastical benefices.

Lord Cornbury was the first governor appointed under the new arrangement, and the commission and instructions which he received, the chief points of which have just been given, formed the constitution and government of New Jersey until the Declaration of Independence, except that New York and New Jersey had the same governor until 1738, after which year each had its own governor, and in New Jersey the council became a separate branch of the legislature, the governor no longer participating in the debates. From the beginning of Cornbury's administration to the Revolution the political history of the province consisted largely of violent contests between the assembly and the governor and his council—the latter constantly striving to extend the prerogative and curb the power of the people, and the assembly maintaining a bold and able contest in defense of the principles of liberty. Notwithstanding the large proportion of Quakers among its early inhabitants, New Jersey never failed to furnish its just quota of men and money for the various American wars waged in the eighteenth century, and its contingent bore a most honorable part in the chief military events of that period. For the campaigns of 1711, 1739, 1746, 1747, and 1748, the province supplied a battalion of 500 men. It was during these last campaigns that the name "Jersey Blues," in vogue since that time, was first applied to the Jersey troops from the color of their uniform—blue faced with red, gray stockings, and buckskin breeches. They were described at the time as

"the likeliest well-set men who ever entered upon a campaign." When the French war of 1754 broke out Jersey again furnished a battalion of 500 men; of these one-half were captured by Montcalm at Oswego, after a gallant resistance, and the remainder at the surrender of Fort William Henry. But the province at once made good the losses, and maintained as many as 1,000 men in 1758, 1759, and 1760, in which last year its contingent took part in the capture of Montreal. In 1761 and 1762 the contingent was 600 men, and again in 1764 for service against the Indians.

During the years immediately preceding the Revolution New Jersey took an active and leading part in all the discussions and measures growing out of the attempt of parliament to impose stamp duties and taxation upon the colonies without their consent. The province was ably represented at the various meetings of the Continental Congress preceding and leading to the war of the Revolution, and from the breaking out of hostilities bore more than its full share of the burdens necessary to bring the war to a successful conclusion. The last provincial assembly was prorogued in December, 1775. The Provincial Congress, elected in accordance with the ordinance of the preceding Congress, convened in June, 1776, and on July 18th assumed the title of the "convention of the State of New Jersey." An act of Assembly of September, 1777, substituted the word "State" for the word "Colony" in all cases of writs, commissions, indictments, etc., etc. In the war New Jersey furnished to the "continental line" 10,726 men, besides large numbers of militia, and expended for war purposes, on account of the continental government, \$5,342,770. Some very important and interesting operations of the war were conducted within the limits of the State; and from its peculiar position New Jersey suffered more from the evils of the war than any of the thirteen original colonies, except, perhaps, South Carolina. In the whisky insurrection of 1794 the State furnished more than 2,000 militia, who under General Howell formed part of the army in Pennsylvania. In the war of 1812 it furnished 7,000 militia, and in the Mexican war three companies of regular infantry and a battalion of volunteers. At the breaking out of the civil war of 1861 the number of men available in the State for military duty was 98,806; and during that war New Jersey organized and maintained thirty-seven regiments of infantry, three regiments of cavalry, and five batteries.

NEW JERUSALEM CHURCH. See SWEDENBORG.

NEW LONDON, a city and port of entry of the United States, one of the county towns of New London county, Conn., lies on the west bank of the Thames, about three miles above its entrance into Long Island Sound. It is the southern terminus of the Central Vermont Railroad, and a station on the New York, New Haven and Hartford and the New York, Providence and Boston Railroads, whose trains cross the river by ferry. By rail it is 126 miles from New York and 62 from Providence. The city is built on a declivity facing the southeast, and from the higher point enjoys fine views over Long Island Sound and the surrounding country. To the south lies Fort Trumbull. At Groton Heights, on the opposite bank, a small battery occupies the site of Fort Griswold, near which is a granite shaft, 127 feet high, commemorating the massacre of its garrison by Arnold's troops in 1781. As a fashionable summer resort, rivaling Newport, it is well provided with both private residences and public hotels. The city hall, the county courthouse, and the custom-house are among the most conspicuous buildings. The harbor of New London, the best on Long Island Sound, and one of the best in the world,

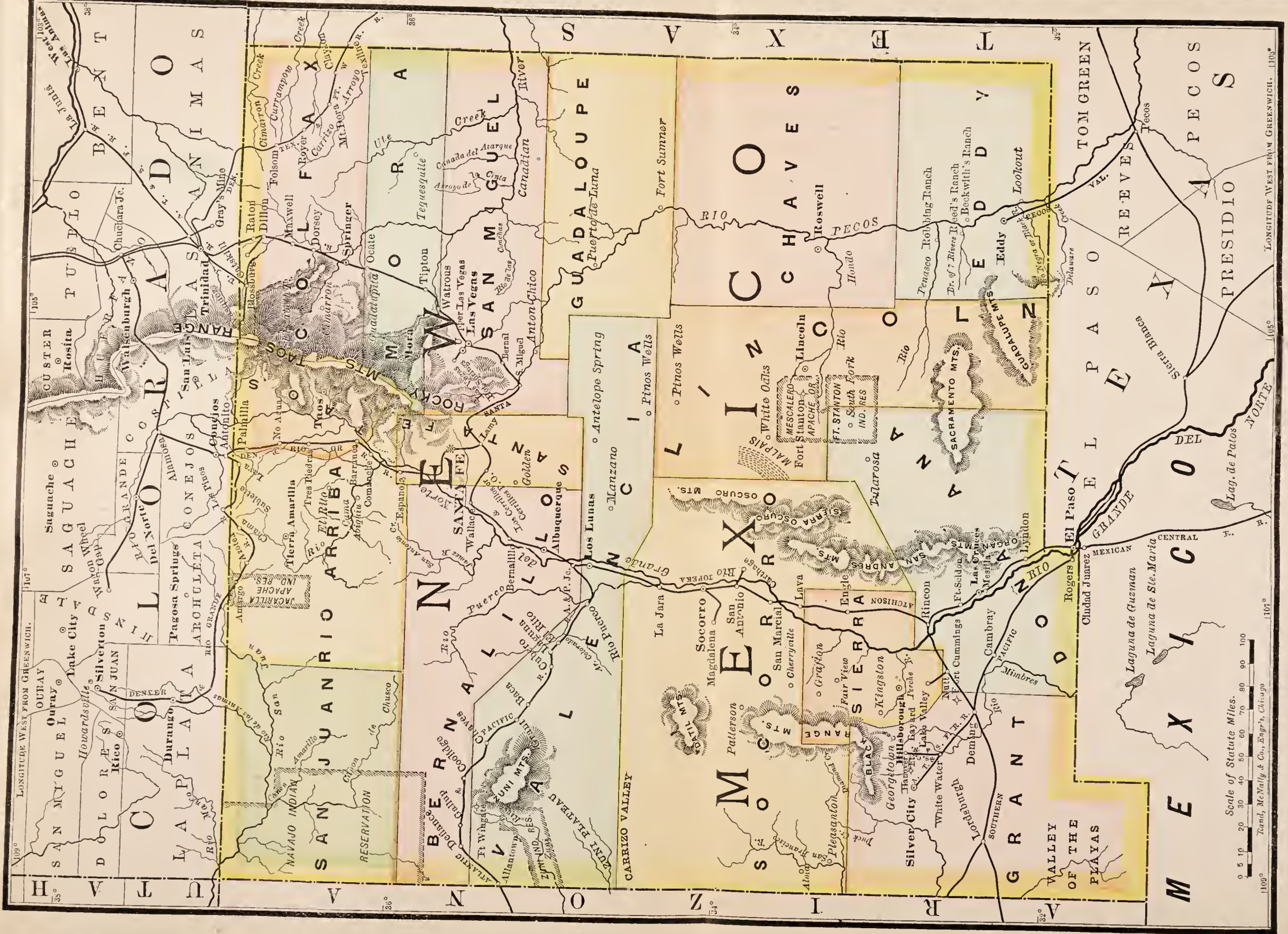
is three miles in extent, and has a depth of from four to seven fathoms; the river is navigable also for three miles above the city. The granite wharf, built by the New London Northern (Central Vermont) Railroad, is 1,125 feet long, 220 feet wide at the river end, and 150 feet at the shore end. On the east side is a United States navy-yard. As a whale-fishery port New London was from 1840 to 1857 second only to New Bedford. Since the decline of the whale fishery it has prosecuted the seal fishery (Alaska and New Shetland), and the cod and mackerel fisheries. A woolen-mill, a cotton-gin factory, iron foundries, a fruit-canning establishment, and an extensive cracker bakery are the chief manufacturing works in the city. The population was 10,115 in 1860, 9,575 in 1870, 10,537 in 1880, and 13,759 in 1890. In 1645 John Wintthrop the younger settled on what was then known as Pequot Harbor, and in 1658 the Connecticut assembly resolved that the "plantation" should bear the name of New London. During the Revolution the harbor was the headquarters of the Connecticut privateering fleet. In 1771 the city was captured by Benedict Arnold, and, together with Groton, was burned by accident or design.

NEW MADRID, a town of the United States, and the county seat of New Madrid county, Mo., is located on the Mississippi river at the terminus of the Little River Valley and Arkansas railroad, forty-five miles southwest of Cairo, Ill. In 1811, the vicinity of the present town was visited by an earthquake which caused a large portion of the country to sink several feet below the surface. It was for a time overflowed by the Mississippi, and a large lake yet remains to testify to the violence of this seismic disturbance. The town contains a court-house, three churches, several schools, one newspaper office, one hotel, and nearly twenty stores, together with two saw-mills, one flour mill and one planing mill. Its population in 1890, was 1,200.

NEWMARKET, a market-town, partly in Cambridge and partly in Suffolk, and the seat of important horse races, is situated on the Cambridge and Bury branch of the Great Eastern Railway, thirteen miles northeast of Cambridge and sixty north by east of London.

NEW MEXICO, a Territory of the United States, is bounded on the north by Colorado, on the east by Texas and unorganized "public lands" adjacent to the Indian Territory, on the south by Texas and Mexico, and on the west by Arizona. It forms nearly a square, being about 335 miles in width from east to west and 345 miles in length from north to south on the eastern border, which lengthens to 390 miles on the west. As formed originally by the organic act of 1850, the Territory embraced Arizona and southern Colorado. In 1854 the "Gadsden Purchase" from Mexico added a strip along the southern boundary. In 1863 Arizona was detached and made into a separate Territory, and in 1865 the portion of New Mexico north of the thirty-seventh parallel was added to Colorado, leaving the Territory with its present boundaries, and an area of 122,460 square miles.

The whole area is elevated far above the ocean, the table-lands of the north being 6,000 to 6,500, those of the center 5,000, and those of the south about 4,000 feet above sea-level. The fall in the Rio Grande from the Colorado line to that of Mexico is about 3,500 feet. The whole except the eastern portion is traversed by mountains, passing from north to south, not continuously but in broken ranges, which, for convenience of description, may be divided into three parts. The main range of the Rocky Mountains enters the territory from the north, the highest peaks being the Costilla (12,615 feet), Taos, Mora (12,020), Truchas (13,150), and Baldy (12,661). This range disappears as a continuous chain



Scale of Statute Miles.

0 5 10 20 30 40 50 60 70 80 90 100

Trans. McNally & Co., Engrs, Chicago

109° 101° 105°

LONGITUDE WEST FROM GREENWICH. 109°

near Glorieta: Running east from this as a kind of spur along the Colorado line are the Raton Mountains, the pass in which, south of Trinidad, is 7,893 feet high. The railroad crosses this range through a tunnel. Commencing about twenty miles south of Santa Fé, and extending southward on the east side of the Rio Grande, is a broken range, known variously in localities from north to south as the Cerrillos, Placer, Sandia, Chilili, Manzana, Jumanes, Oscura, San Andres, and Organ Mountains—the last-named crossing into Mexico near El Paso. Near to the Rio Grande in Socorro county are the Fra Cristobal and Caballo Mountains. East of the above chain is a series of ranges, generally short, locally known as the Gallinas, Jicarilla, Carrizo, Capitan, Sierra Blanca, Sacramento, Hueco, and Guadalupe Mountains. On the west of the Rio Grande another broken range runs south, commencing at the singularly conspicuous San Antonio Mountain, close to the Colorado line, and known in its several parts as the Petaca, Valles, Nacimiento, Jemez, San Mateo, Ladrones, Oso, Madalena, Socorro, San Mateo (of Socorro), Black Range, Mimbres, and Florida Mountains, the latter extending into Mexico. Still farther to the west, and near the Arizona boundary, yet another series of comparatively short ranges is found, consisting of the Carrizo, Tunicha, and Chusca Mountains, which constitute part of the "great continental divide" separating the waters flowing into the Gulf of Mexico from those running into the Pacific, and more to the south the Zuñi, Datil, San Francisco, Escudilla, Tulerosa, Luera, Mogollon, Diablo, Pinos Altos, Burro, Sarampion, Hacha, Perro, Animas, and Peloncillo Mountains. These mountains are seamed with great "cañons," which penetrate the larger "mesas" or tablelands in various places, where in some way the covering of lava which is their usual protection has been removed. Between contiguous ranges or spurs of the same range are frequently found "parks" of great beauty and fertility. These specially abound in the western part of Colfax county.

New Mexico, while generally requiring irrigation for its cultivation, is more fully provided with rivers than any of the other mining States or Territories. Its waters flow east to the Mississippi, south to the Gulf of Mexico, and west through the Colorado and Gila to the Gulf of California and the Pacific Ocean. The Rio Grande, called also the Rio Bravo del Norte, passes completely through the center of the Territory from north to south. It receives many tributaries, the principal being the Santa Fé and Galisteo from the east, and the Chama, Jemez, Puerco, and Alamosa from the west. Its valley is of great fertility, and capable of supporting a large population. The northeastern part of the Territory, including the greater part of the counties of Colfax, Mora, and San Miguel, is drained by the Canadian or Red River, which flows into the Arkansas. The branches of this stream are very numerous, the principal ones being the Cimarron, Mora, Concha, Pajarito, and Ute. The Pecos rises northeast of Santa Fé, and, flowing south, gives value to a vast belt of land, until it crosses the Texas line and finally joins the Rio Grande itself. Its valley is unsurpassed for fertility and agricultural worth. Among other streams, the Tecolote, Gallinas, Hondo, and Peñasco are tributaries to it. In the northwest is the Rio San Juan, from which that whole section is called the "San Juan country." It flows west to the Great Colorado, and has as its principal branches in New Mexico the Animas from the north and the Chaco from the south. In the central west are the headwaters of the Little Colorado, and in the southwest those of the Gila, with the Mimbres, which flows south into Mexico.

In almost all parts of the Territory, except the pastoral plains, the precious metals are found, the mineral extending from the extreme north to the southern boundary. The eastern slope of the Rocky Mountains, in Colfax county, abounds in gold, and Elizabethtown, its chief village, was the scene of great mining prosperity a few years ago. The metal is found in "leads" as well as in extensive "placers." On the opposite side of the range are both gold and silver, and a little farther south, near Picuris, are large deposits of copper. Traveling southward we find various minerals of value in the mountains east of Santa Fé; and the Cerrillos mining district, about twenty miles south of the capital, presents a rich deposit of silver not as yet fully developed. Here also are the famous turquoise mines, the largest in America, which played so important a part in the early history of the Territory. To the west in the Nacimiento region is a great body of copper. At the "Old Placers" and "New Placers," in the southern extremity of the Santa Fé country, are located inexhaustible supplies of placer gold. The Manzana, Ladrona, and Madalena ranges, and, indeed, nearly all the mountains on both sides of the Rio Grande, contain rich mineral. Silver mines of great value are worked in the Socorro Mountains, directly west of the city of that name. The Black Range country is rich in silver and copper; and the more recent discoveries on the Percha river at Lake Valley promise to be of extraordinary richness and extent. The vicinity of White Oaks in Lincoln county is especially noted for its free gold, and the San Andres, Caballo, and Organ ranges abound in valuable ores. The greatest development has taken place in Grant county, whose "Santa Rita," "Hanover," and other copper mines are well known; the vicinity of Silver City and Georgetown produces great quantities of silver, while the newer districts in the southwest, in the vicinity of Shakespeare and Lordsburg, are also rich in the last-mentioned metal. To the north of Silver City are the Mogollon Mountains, where valuable mineral deposits are found. The mines, especially those of silver, were extensively worked by the Spaniards down to 1680.

Bituminous coal is found in inexhaustible quantities in very many sections of the Territory, notably near Raton in Colfax county, along the Galisteo river on the line of the Atlantic and Pacific Railroad, and near the Chama river in the northwest. Anthracite coal of an exceedingly fine quality exists in large amounts near Cerrillos station, being superior to many of the coals of Pennsylvania, and by far the best fuel thus far discovered west of the Mississippi river. Iron is found in many localities, but has not yet been worked, the more valuable metals monopolizing attention. Mica mines of large extent and excellent quality are at Petaca, Mora, near Nambé, and in other localities. Lead abounds in many sections carrying silver, and notably in the Cerrillos mines. Plumbago is found in Colfax county; and cement of a very superior quality is made at Springer. Gypsum, fire-clay, and mineral paints are among the mineral resources of the Territory; and marbles and other excellent building-stones abound.

Mineral springs of various kinds of great excellence are found in different localities. Prominent among them are the Las Vegas hot springs, the Ojo Caliente in Taos county, the Jemez hot springs, and the Hudson springs. These all have special medicinal qualities, and are of high temperature, the Ojo Caliente water being 114° and the Jemez 168°. There are also important springs south of El Rancho in Taos county and east of Santa Fé.

The climate is dry and the air clear throughout almost the entire year. The temperature at Santa Fé,

which is considered to have the best climate in the Territory, is sometimes as low in the winter as at New York, but the dryness of the atmosphere prevents the cold from being felt to anything like the same extent. The more southerly towns are, of course, warmer, not only on account of the difference in latitude, but also because of their decreased altitude. The rainy season occupies about a month, varying in time from the middle of July to the middle of September, but even then a wholly cloudy day is seldom seen, the mornings being bright, with showers in the afternoon. The comparative death-rate from pulmonary diseases in New Mexico is less than anywhere else in the United States, the proportions being—New England 25, Minnesota 14, Southern States 6, New Mexico 3. The average rainfall at Santa Fé for eight years (1874–81) was a little less than 14½ inches, whereas the average at New York was 43, Boston 45, Philadelphia 44, Washington 37, St. Louis 42, and Savannah 48. The mean temperature was 48½°. The atmosphere is so clear and pure as to be proverbial. From the first characteristic arises the deception as to distances so generally experienced by strangers; and the second is evidenced by the fact that everywhere throughout the Territory the natives hang up their meat out-of-doors to dry, and use pieces of it as required, not the slightest taint arising from it during a series of months.

The greater portion of New Mexico is pastoral, being unfitted for agriculture from lack of water for irrigation. Wherever there is sufficient water either in streams or in springs to supply the wants of animals, the grass is amply sufficient to support either cattle or sheep. The Territory abounds in the most nutritious grasses, which retain their virtues during the winter; and the climate is such that shelter is not required other than that afforded by nature, in valleys and woods. The number of sheep is variously estimated from 7,000,000 to 10,000,000, and they are raised in every county. Within the past few years the breed has been much improved by the introduction of merino, Cotswold, and other fine-wooled varieties. The cattle business has reached enormous proportions within a few years, and is steadily advancing in importance. The immense profits received have induced the investment of large amounts of capital, and all the desirable ranches are being rapidly taken up and stocked. The business is changing in its character in two ways. Large corporations are taking the place of small owners, and, instead of ranging over the plains, the cattle are now generally confined to tracts exclusively owned or occupied, and fenced.

Agriculture is mainly limited to the valleys. Those of the Rio Grande, the Pecos, the Canadian, the San Juan, and their tributaries, though generally narrow, contain large areas of arable land of extraordinary fertility. They produce large crops of grain and of most kinds of vegetables, especially onions, beets, turnips, cabbages, cauliflowers, etc. Potatoes succeed best in the mountainous regions. The Taos valley is an exceptionally fine wheat country, and before the advent of railroads supplied a great part of the Territory with its flour. The Mora valley is also celebrated for its wheat. It is as a fruit-producing region, however, that a large portion of the irrigated land in the Territory specially excels. The Rio Grande valley from Embudo to Mesilla is particularly adapted to this purpose. The area of fruit and vine culture is being yearly extended. Peaches, plums, and apricots come to great perfection in the north, and pears, apples, quinces, cherries, etc., as well as the stone fruits, throughout the middle and southern sections. Grapes flourish from Bernalillo to El Paso, and in some favored spots like La Joya farther north. The grape principally cultivated is the "Mis-

sion," which produces excellent wine. Hardy American varieties like the Concord will do well anywhere, and the less hardy European varieties, such as the White Muscat, Flamed Tokay, etc., succeed admirably in the vicinity of Las Cruces. The Pecos valley also produces fruit of extraordinary size and beauty.

The supply of timber, especially of pine, is almost inexhaustible. It exists in nearly all the hilly and mountainous parts of the Territory, but is of very superior quality as regards both height and straightness in the vicinity of Tierra Amarilla. Cedar abounds in many localities, and the piñon makes an excellent fuel. Oak, maple, walnut, and ash are found to a more limited extent. The varieties of poplar commonly known as cottonwood and quaking aspen are the most common deciduous trees, and grow in almost all parts of the Territory. Several other native plants are proving of value. The *Yucca* of different varieties abounds—*Y. filamentosa*, commonly called amole or soapweed, covering immense tracts. Experiments have recently been made with a view to utilizing the fiber of the large serrated variety abundant in the south in the manufacture of rope, and the smaller kinds in paper-making, as well as using the root in preparing a substitute for soap. These bid fair to make this very abundant plant of large commercial value. The cañaigre has long been known to possess powerful tanning properties, and recent experiments by the department of agriculture and elsewhere have demonstrated its value as a substitute for bark and other agents. The plant grows wild over a large extent of country, and its importance in a district producing so many hides and skins can hardly be overestimated.

The executive officers are a governor and a secretary. The higher judiciary consists of a chief justice and two associates, each of whom presides over the courts in one district, all three sitting together as an appellate supreme court in January of each year. The legislature consists of a council of twelve members and a house of representatives of twenty-four, elected by counties biennially. The governor possesses the veto power. The territorial officials are a treasurer, auditor, attorney-general and two district attorneys, and an adjutant-general. In each county there are a probate judge, sheriff, and other local officers, the chief authority being vested in a board of county commissioners of three members elected by the people. The counties are divided into precincts, in each of which there is a justice of the peace and a constable. At present there are twelve counties in the Territory. Public education is in charge of a board of three school commissioners in each county. A tax of one-fourth per cent. is levied for the support of public schools. Precincts may become independent school districts at their option.

The population of the Territory was 91,874 in 1870 and 119,565 in 1880. In 1890 census returns gave 153,593. The capital, Santa Fé, had 6,713 inhabitants.

The first European that traversed the Territory was Cabeza de Vaca (Nuñez), the treasurer of the unfortunate expedition of Panfilo Narvaez to Florida, who, being cast ashore on the coast of Texas, crossed the continent with three companions, and after encountering infinite difficulties and dangers arrived at Spanish settlements near the Gulf of California. On the way he passed through a land of "fixed habitations," which were evidently the Pueblo towns, followed the Rio Grande for many miles, and on his return to civilization gave such an account of his travels that great interest was excited. In consequence, Coronado, the governor of New Galicia, sent Marcos de Niza, a Franciscan monk, with Stephen, a negro who had been one of Vaca's companions, to reconnoiter the country. They penetrated as far as Zúñi, then called Cibola, where Stephen was

killed; but Marcos made up for the lack of substantial success by the marvelous nature of the report he presented. The next year, 1540, Coronado himself headed an expedition of 300 Spaniards and 800 Indians, and started from Culiacan on Easter Monday. He succeeded in finding Cibola, which he subjugated with the surrounding country, and then proceeded to the province of Tiguex (on the Puerco river). After this expedition several friars at various times entered the country, establishing missions, often at the cost of their lives. Among them one of the most prominent was Agustin Ruiz, who was killed in 1581. Almost immediately after this came the expedition of Espejo, who was sent by the viceroy to protect the missions. The next expedition of note was that of Oñate, toward the close of the century, which carried a large number of additional colonists into the Territory. From this time the Spanish population increased rapidly, and mining was extensively engaged in, the natives being reduced to a virtual condition of slavery in the mines. In 1680 the Indians, who had long been on the verge of rebellion, revolted, and under the lead of Popé, a chief of large influence, marched on Santa Fé, and there besieged Governor Otermin and the Spanish army, who were finally compelled to evacuate the town and retreat to El Paso. For thirteen years the Pueblos continued to control the country, defeating successive Spanish expeditions, until in 1693 Diego de Vargas, the new governor, succeeded in conquering them and a peace was made, one of the terms of which was that there should be no more slavery in the mines. In fact the Indians had filled up all the shafts in the meantime. For over a century afterward little occurred to disturb the tranquillity of the Territory, except occasional wars with the surrounding savage tribes. In 1804 Lieutenant Pike, exploring the headwaters of the Arkansas, by mistake camped on Mexican soil and was brought into Santa Fé and sent to Chihuahua as a prisoner. About this time the first goods were brought across the plains to the New Mexican market, being the commencement of the overland traffic of the Santa Fé "Trail," which increased yearly in importance until the railroads took the place of the "prairie schooner." In 1820 Mexico became independent, and New Mexico began to be governed by political chiefs instead of Spanish "Gobernadores."

By a change in the constitution in 1835, governors were appointed instead of elected, and Albino Perez was sent from Mexico as the new ruler. This excited much discontent, which was increased by the enactment of a new tax law two years later. About August 1, 1837, a revolutionary movement commenced in the north of the Territory among both Mexicans and Pueblos, having for its center the town of Cañada or Santa Cruz. Governor Perez marched to meet the insurgents, but was deserted by nearly all his troops and compelled to fly, and was soon after overtaken and killed near Agua Fria. A number of other prominent officials were also killed; and on August 10th Jose Gonzalez, a Taos Indian, was installed as governor in the palace. General Manuel Armijo, who had held high positions before, raised troops at Albuquerque to suppress the revolt, and finally defeated the rebels at Cañada. The Mexican Government confirmed his acts and appointed him governor, which office he held with some intermissions until the coming of an American army in 1846 under General Kearney, who marched from the Missouri and took possession of the Territory without bloodshed—General Armijo retiring southward. A provisional government was established by the Americans, and Charles Bent, an old resident, appointed governor, but he was killed in a revolt in January, 1847.

The treaty of Guadalupe-Hidalgo made New Mexico a part of the United States, and by an act of Congress of September 9, 1850, it was organized as a Territory with a regular government. Early in 1862 a Confederate army from Texas invaded the country and occupied Santa Fé, March 10th; they were defeated, however, at Glorieta on March 28th, and evacuated the capital April 8th. The people of the Territory were commendably loyal, and supplied 6,000 men to the Union army.

The first rail was laid in New Mexico, November 30, 1878, by the Atchison, Topeka and Santa Fé Railroad, which reached Las Vegas July 1, 1879, Santa Fé February 9, 1880, and connected with the Southern Pacific at Deming March 18, 1881. This and the construction of the Denver and Rio Grande and the Atlantic and Pacific Railroads have given a great impetus to the Territory, which has (1890) 1,364 miles of track.

NEW MILLS, a township of Derbyshire, England, is situated at the confluence of the rivers Goyt and Kinder, on the borders of Cheshire, eight miles southeast of Stockport and seven southwest of Glossop. The name New Mills was given to it from a cornmill erected on the Kinder in the hamlet of Ollersett, and is now specially applied to the group of factories which have grown up around it. Formerly paper and cloth were the staple industries of the district, but now the inhabitants of the various hamlets are occupied chiefly in iron and brass foundries, cotton-mills, and print-works. The population in 1890 is 7,000.

NEW ORKNEY. See NEW SOUTH SHETLAND.

NEW ORLEANS, a city of the United States, situated on the left bank of the Mississippi, 107 miles from its mouth, in that portion of the State of Louisiana which constitutes the river's larger delta. This peculiar region is an irregular expanse of densely wooded swamps, wide prairies, and sea marshes, embracing the whole coast of Louisiana on its southern border, and, narrowing rapidly northward, presents a total area of some 20,000 square miles of land and water.

The river at this point varies from 1,500 to 3,000 feet in width, and its broad channel often stretches almost from shore to shore, with a depth varying frequently at short intervals from 60 to more than 200 feet. The speed of the current reaches, in times of high water, a rate of five miles an hour. Along the immediate front of the city's principal commercial quarter, this current, losing some of its force by change of direction, deposits its alluvium in such quantities as to produce a constant encroachment of the shore upon the harbor. At its widest this new land, or batture, with wharves, streets, and warehouses following eagerly after it, has advanced nearly 1,500 feet beyond the water-line of a century and a half ago.

New Orleans is emphatically a commercial city. It is from its commercial value as the southern gateway of the immense valley behind it, and as the dispenser of the products of this greatest agricultural valley in the world that New Orleans has grown from a wild and indolent little frontier town of 10,000 inhabitants to the dimensions of a great city. Along its winding harbor front one sees, in the season that follows the harvests of the south and west, the energies and activities of an exporting movement not excelled in volume or value on the American continent save by New York. All other movement is subsidiary or insignificant, the import trade is small; manufactures are inconsiderable; mining interests are almost unknown, while there are comparatively no naval construction and but two notable government establishments—the mint and the custom-house. Educational and scientific institutions, conservatories of

art, galleries, monuments, and other evidences of the taste and refinement of the inhabitants are numerous.

On any hand it requires but a step or two aside from the current of commercial movement to carry one into the bowery repose of a city of villas and cottages, of umbrageous gardens, intersected by 470 miles of streets shaded by forest-trees, haunted by song birds, fragrant with a wealth of flowers that never fails a day in the year, and abundant, in season, with fruit—the fig, the plum, the pomegranate, the orange. No other large city in America is so laid open to the sunshine and the air. With the exception of Chicago no other American city covers so large a site as New Orleans, whose inhabitants, 242,039 in number, in 1890, have spread out their town over an area of 155 square miles.

New Orleans is exceptionally interesting among cities of the United States for the picturesqueness of its older sections, and the language, tastes, and customs of a large portion of its people. It was founded in 1718 by Jean Baptiste Lemoyne de Bienville, a French Canadian, governor of the French colony which, nineteen years earlier, had been planted by his brother D'Iberville on the neighboring shores of the Gulf, along the eastern margin of the Bay of Biloxi. A few years after its founding, and while it was still but little more than a squalid village of deported galley slaves, trappers, and gold hunters, it was made the capital of that vast Louisiana which loosely comprised the whole Mississippi valley to Canada on the north and without boundary on the west, under the commercial domain and monopoly of John Law's scheme, so famed in history under the merited nickname of the Mississippi Bubble.

After being subjected to French and Spanish domination for nearly one hundred years, the city, with a population of 10,000 souls, passed from the hands of the French colonial prefect to those of the commissioners of the United States. At the time, the prospect of its future commercial greatness was not only appreciated but was exaggerated even by the most sagacious minds; for they regarded it in the light of its remarkable geographical position, and of those stirrings of revolution which were beginning to promise the birth of other republics round about the broad circuit of the Mexican Gulf, with maritime powers and commercial energies that must give the position of New Orleans an inestimable value.

New Orleans held its highest place on the comparative scale of cities in the United States when, by the census of 1840, only New York, Philadelphia, and Baltimore were greater in population. In the decades that followed, these cities left it far behind and others overtook it and passed it by. The development of the carrying trade on the lakes of the far north, the adoption by the world's maritime trade of ships and steamers drawing too much water to pass the bars at the mouth of the Mississippi, and in the city the riot made by death, which in three years (1853-55) from a population diminished by flight to barely 145,000, carried off over 35,000 persons—these things and others combined to impede the town's progress at a time when the growth of American cities was a marvel of the times, and to reduce her comparative importance in population, wealth, enlightenment, and architectural dignity.

Turning from these comparisons, and contrasting the city only with itself, the trading post of 1721 had been changed in 1860 to a metropolis, the imports, exports and domestic receipts of which aggregated \$334,000,000. In the latter year, the election of a president from the Republican party was followed by the war between the States, paralyzing the commerce and trade of the city, and producing an effect from which New Orleans has been more than a quarter of a century in recovering.

Only in the last years did its total commerce distinctly reach the magnitude it enjoyed in the year 1860, and the drawbacks enumerated so expend their power, that New Orleans now looks out upon a future of more genuine promise than ever before. A system of JETTIES (*q.v.*), at the mouth of the Mississippi, built by the distinguished engineer Eads in 1879, has opened the city's deep and spacious harbor to the largest ocean craft. Lines of steamers to the great ports of Europe are replacing with their great carrying capacity the light tonnage of other days. An active sanitary system, which grows every year better, gives reasonable promise of immunity from the deadly epidemics of former years; street paving has recommenced; the inadequate and superficial drainage is being improved, under the direction of a sanitary association auxiliary to the board of health, a diligent house-to-house inspection is being performed, and the open gutters that are in all the streets are daily flushed during the warm months with water thrown into them by powerful pumps at the river front. The annual mortality rate now averages 26.52 per 1,000. The old spirit of dependence upon natural advantages which once deluded the people of the city is yielding to a more energetic acceptance of the principles of modern commerce, and railway connections, near and remote, are increasing year by year. The immense increase of population and products in that wide southwest that stretches out beyond to the Mexican border offers new accessions of commercial tribute. Mexico holds out fair assurance of a new era of political order and material development; and within the city's immediate bounds both the convictions of her citizens and the movement of capital are recognizing theoretically and practically the necessity and advantage of manufactures. About \$10,000,000 are at present invested in this direction, and the aggregate is steadily growing.

Within the last seven years a new impulse toward architectural improvement has shown itself, and several edifices of comparatively imposing character have been erected. Chief among these are the Cotton Exchange, Louisiana National Bank, the Jewish Widows' and Orphans' Home, etc.

The municipal control of the city is vested in a mayor, comptroller, treasurer, commissioners of public works and buildings, city attorney, city surveyor, and a board of aldermen consisting of thirty members. During the year 1889, the receipts of the city from all sources amounted to \$1,264,319.03 and the expenditures to \$1,189,375.47, the latter including \$155,000 paid for the maintenance of the police department, a similar amount for that of the public schools and \$223,500 for the support of the fire department.

On January 1, 1890, the municipal debt aggregated \$17,009,209.82, made up of a floating debt amounting to \$548,949.93, a bonded debt of \$16,395,861.11, and miscellaneous debts footing up \$64,398.78. The real and personal property of the city at the same date was listed at \$122,000,000 and the rate of taxation fixed at 20 mills per \$100.

During the past ten years the educational system of New Orleans has made marked progress. It is a large and excellent one, deserving of much praise and affording to the youth of the city, both white and colored, excellent facilities for the acquisition of learning through the primary, intermediate, and high school grades. Supplementary to these are the Tulane University, containing, in addition to medical, law, and academic departments, an industrial school, the Sophia Newcomb College for girls, a branch of Tulane College, four colleges established by the colored people and patronized by both sexes, the College of the Immaculate Concep-

tion, Locquat Institute, and many other private institutions. Among the libraries are the Howard Memorial, the Louisiana State and the Fisk or Tulane Library, containing a total of 170,000 volumes.

Churches, both Catholic and Protestant, are numerous and largely attended. Many of them present an imposing appearance, notable among which are the French Cathedral opposite Jackson Square, Christ Episcopal Church on St. Charles street, the Church of the Immaculate Conception, St. Patrick's, and some others.

The first settlers of New Orleans were such men as colonies in America were generally made of when planted by royal commercial enterprise, and such wives as could be gathered hap-hazard from the ranks of Indian allies, African slave cargoes, and the inmates of French houses of correction. As time passed, gentler and often better blood was infused by the advent of the *filles à la cassette*, by victims of *lettres-de-cachet*, by the cadets of noble families, holding land grants or military commissions, by Spanish officials glad to strengthen their influence in the colony through matrimonial alliances, and by royalists fleeing the terrors of the French Revolution. The influences of the climate and landscape were such as to emphasize rather than counteract the effects of these conditions; and, when in the year 1809 Napoleon's wars caused an exodus of West Indian creoles into New Orleans that immediately doubled the town's population, the place naturally and easily became the one stronghold of Latin-American ideas in the United States, a harbor of contrabandists, Guadeloupian pirates, and Spanish-American revolutionists and filibusters. Under the glacier-like pressure of Anglo-American immigration, capital, enterprise, and education, this creole civilization has slowly and with stubborn reluctance yielded ground, and is at length fairly beginning to amalgamate with the better social system of the American nation.

The colored population, notwithstanding the presence among it of that noted free quadroon class which has enjoyed a certain legal freedom for many generations, has not greatly improved since the date of emancipation. A conventional system of caste cuts them off from the stimulating hope of attaining social rank, and confines them closely to servile employments. The probability seems to be that their decided elevation must wait upon their acquisition of material wealth, an achievement which the conditions mentioned and some inherent deficiencies of the race tend to make extremely difficult. Besides the large Anglo-American and creole populations, there are in New Orleans weighty fractions of Irish and Germans and an appreciable number of Italians, Sicilians, and Spaniards. Another noted feature of New Orleans is its cemeteries. Owing to the undrained condition of the subsoil, burials are made entirely above ground, in tombs of stuccoed brick and of granite and marble. Some of these are very elegant and costly, and many of the burial-grounds, with their long alleys of these tombs of diverse designs deeply shaded by avenues of cedars and the *Magnolia grandiflora*, possess a severe but emphatic beauty.

The climate is not marked by extremes of heat or cold. The wide reaches of water and wet lands that lie about the city on every side temper all airs, and the thermometer rarely passes above 95° or below 27° Fahr. The consequent humidity of the atmosphere, however, gives the climate an enervating quality and an apparent warmth and cold beyond the actual temperature. It is rarely invigorating, and during the long summer between June and October is distinctly though not severely debilitating; but in the absence of epidemic yellow fever, whose visitations are becoming more and more infrequent, there is no "sickly season;" and those

who visit the city between the months of November and June, the term in which the commercial movement is at its height, may enjoy from its beginning to its end the delights and beauties of a redundant springtime. The United States census of 1890 gave New Orleans a population of 242,039.

NEW PHILADELPHIA, an Ohio town, the capital of Tuscarawas county, lies on the Tuscarawas river. It has railroads, telegraphs, banks, churches, schools, etc. It has some manufactures, and a trade in coal and iron. Population, 5,000.

NEW PLYMOUTH, a seaport on the west coast of the North Island of New Zealand, is situated about twenty miles to the northeastward of Cape Egmont. It is the capital of the provincial district of Taranaki.

NEWPORT, a municipal and parliamentary borough of Hampshire, England, and the county town of the Isle of Wight, is situated near the center of the island, at the head of the navigation of the Medina river, about seven miles from the sea at Cowes.

NEWPORT, a seaport, market-town, and municipal and parliamentary borough of Monmouthshire, is situated on the right bank of the Usk, about four miles from its confluence with the Bristol Channel, and twelve miles northeast from Cardiff. On the east, north, and west it is finely sheltered by a line of lofty hills, and the neighboring scenery is picturesque; but the town is chiefly composed of a mean class of houses, although there are many good villas in the suburbs. The old parish church of St. Woollos is one of the most curious churches in England. The old castle, built about 1130 by Robert earl of Gloucester, was a very extensive structure in the Late Perpendicular. Newport owes its rapid increase to its situation on a deep and spacious tidal river, which renders it a convenient outlet for the trade of a very rich mineral district. It is now supplied with very extensive docks and wharves, to which steamers of the largest size can have access at all tides.

The population of the parliamentary borough (area 1,690 acres) in 1881 was 38,427.

NEWPORT, a city of the United States, capital of Campbell county, Ky., lies on the south bank of the Ohio river, opposite Cincinnati, and separated from Covington by the Licking river. With the larger city it is connected by a road-and-railway pier bridge, and with the lesser by a suspension bridge partly used by a street railway. Practically both Newport and Covington are residential suburbs of Cincinnati, but in the matter of population (24,918 in 1890) Newport ranks third among the cities in the State. The local manufactures comprise rolling-mills, steel-works, iron foundries, watch-case factories, and stove factories. For many years a small garrison of United States soldiers has been stationed here. The first settlement dates from 1791.

NEWPORT, a city of the United States, one of the capitals of the State of Rhode Island, and among the most fashionable of American watering-places, is situated on the west coast of the island from which the State derives its name, on the isthmus of the southern peninsula. By rail it is 19 miles south-southwest of Fall River, and by steamer 162 miles from New York. In front lies an excellent harbor opening into Narragansett Bay, with a fine anchorage in thirty feet of water between Fort Adams (a military post of great importance) and Goat Island (headquarters of the torpedo division of the United States navy), and allowing vessels of eighteen feet draught to reach the piers at low water. But it is rather the attractions of the east and south coast that have made the fortunes of the modern city—First or Easton's Beach, one of the safest for surf-bathing; Second or Sachuest Beach, exposed to heavier

breakers; Third Beach, more secluded than either; the Hanging Rocks, where Berkeley is said to have composed his *Minute Philosopher*; Lily Pond Beach; and the Spouting Cave, where the water dashes through a hole in the roof to a height at times of fifty feet. These and other points of interest are connected with the city by avenues and drives, many of which are lined in whole or in part with villas and cottages; and in fact Newport as a watering-place may be said to comprise the whole of the southern peninsula. In its narrower limits as a city it is a place of no small interest. In Washington Square, the central point of the old town, stand the State-house (dating from 1742), the city hall (1763), and the opera-house (1867). Trinity Church has an organ presented by Bishop (then Dean) Berkeley, and the first Baptist church dates from 1638. The synagogue, founded in 1762, is the oldest in the United States; it is still used, though there are few Jews in Newport, endowments for keeping it in repair and maintaining services having been left by the brothers Abraham and Judah Touro, the latter of whom also gave the city \$10,000 toward the purchase of Touro Park. The Jewish cemetery is the subject of one of Longfellow's best pieces. Redwood Library, established in 1747, has 27,000 volumes; and there is a free people's library with 15,000. Besides the bronze statue of Com. M. C. Perry, of Japanese fame, Touro Park contains an old tower, supported on round arches, which has been one of the greatest antiquarian puzzles in the United States—some considering it a monument of the Norsemen who visited America before Columbus, and others maintaining that it is only an old windmill dating from the seventeenth century. At one time, previous to the War of Independence, Newport was the seat of great commercial activity, but it now holds a very secondary position in both trade and manufacturing industry. Its exports and imports in 1882 made a total of only \$17,513; and one or two cotton-mills and a brass foundry are almost its only public works. The population of the city was 12,521 in 1870, 15,693 in 1880, and 19,457 in 1890.

NEW PROVIDENCE. See BAHAMAS.

NEW ROCHELLE, a town of New York, in Westchester county, lies on Long Island Sound. It is a railroad and telegraph station, and has banks, churches, schools, etc. It has also some manufactories, among them being one of druggists' scales. Population (1890), 8,318.

NEW ROSS, a market-town and parliamentary borough of Leinster, Ireland, partly in Wexford and partly in Kilkenny, is situated on the acclivity of a hill on the east bank of the Barrow, two miles below its junction with the Nore, eighty-five miles south-southwest of Dublin and twenty-four west-northwest of Wexford.

NEWRY, a seaport, market-town, and parliamentary borough, partly in Armagh, but chiefly in Down, province of Ulster, Ireland, is situated on the Newry navigation at the head of Carlingford Lough, and on two railway lines, eighteen miles southeast of Armagh and sixty-three north of Dublin. The western part, called Ballybot, is connected with the eastern part or old town in Down, situated on the acclivity of a hill, by four stone bridges and a swivel bridge.

NEW SHOREHAM. See SHOREHAM.

NEW SOUTH SHETLAND, or simply SOUTH SHETLAND, a group of islands on the borders of the Antarctic polar regions, lying about 600 miles south-southeast of Cape Horn, and separated by Bransfield Strait from the region composed of Palmer Land, Trinity Land, Louis Philippe Land, etc. The more considerable islands are those of Smith (or James), Jame-

son (or Low), Snow, Livingston, Deception, Greenwich, Nelson, King George, Elephant, and Clarence. Deception Island is particularly remarkable as of purely volcanic origin. On the southeast side an opening 600 feet wide gives entrance to an internal crater-lake (Port Forster), nearly circular, with a diameter of about five miles and a depth of ninety-seven fathoms. Steam still issues from numerous vents, and hot springs bubble up from beneath the snow-clad surface. Most of the islands are rocky and mountainous, and some of their peaks are between 6,000 and 7,000 feet in height. Covered with snow for the greater part of the year, and growing nothing but lichens, mosses, and some scanty grass, the South Shetlands are of interest almost solely as a great haunt of seals, which share possession with albatrosses, penguins, and other sea-fowl.

NEW SOUTH WALES. The whole of the eastern part of Australia, including the several colonies of New South Wales, Victoria and Queensland, received the name of New South Wales from its first explorer, Capt. James Cook, in 1770. The present colony of New South Wales originated in a penal settlement formed by the British Government, when Capt. Arthur Phillip, R. N., its first governor, arrived at Botany Bay, in H. M. S. *Sirius*, in January, 1788, with six transports and three storeships, where they anchored, but subsequently proceeded to Port Jackson, which was found to be more suitable than Botany Bay for the new settlement; he there landed 750 "persons" under his charge, and the British ensign was for the first time hoisted on the shores of Sydney Cove, now the capital and seat of government.

The colony is situated between $28^{\circ} 10'$ and $37^{\circ} 28'$ S. latitude and 141° and $153^{\circ} 37'$ E. longitude, and comprises an area of 310,700 square miles, *i.e.*, more than six times the area of England, and nearly three times the size of Great Britain and Ireland, with a population, December 31, 1887, of 1,042,919. The early history of the colony was not free from trouble. The first governor, Captain Phillip, remained from January 26, 1788, to December 10, 1792, and was succeeded by Captain Grose, December 11, 1792, to December 12, 1794; Captain Paterson, December 13, 1794, to September 1, 1795, when a duly appointed governor, Captain Hunter, R. N., arrived and remained from September 7, 1795, to September 27, 1800. Capt. P. G. King followed, September 28, 1800, to August 12, 1806, when he was followed by the unfortunate Captain Bligh, whose rule came to an abrupt termination by a general revolt; and after an interregnum of nearly two years, Maj.-Gen. L. Macquarie arrived, and January 1, 1810, assumed the governorship, which he retained for nearly eleven years, since which time there has been a regular succession. "Botany Bay" was for many years almost synonymous with Australia, and had a most unsavory reputation; but with the cessation of the long European war after Waterloo, and the great distress in England consequent upon the return of so many men discharged from the army and navy, attention was attracted to Australia as a center of emigration. In 1813 the interior of the country was explored, and the great plains being found admirably adapted for sheep-farming, several breeds of sheep, including the celebrated merino, were introduced, and a foundation laid for the future prosperity of the country. The agricultural progress of the country has been truly marvelous. In the year 1792 there were but 23 head of cattle, 11 horses, 105 sheep and 43 pigs. On December 31, 1888, there were 411,368 horses, 1,622,907 cattle, 46,503,469 sheep, and 248,533 pigs. In 1887 no fewer than 224,295,209 pounds of wool, valued at \$45,000,000, were exported.

Minerals at first attracted but little attention, but in

these the country is also rich; the gold-fields were discovered in 1851, and up to the end of 1888 these had produced \$185,000,000; coals, during the same period, \$105,000,000. Copper, silver, tin, iron, antimony, asbestos, cinnabar, and kerosene shale are also found; and, in small quantities, diamonds, rubies, opals, and other precious stones. The total annual value of the minerals is about \$19,000,000.

Agriculture is of course the great industry of the colony. About 994,679 acres are under cultivation, producing during the year ended March 31, 1889, 6,520,497 bushels of wheat and other kinds of grain, with 36,839 tons of potatoes, and 55,478 hundredweight of tobacco. Sugar cane to the extent of 110,218 tons was produced, also 805,813 gallons of wine, 2,601 gallons of brandy, and 19,693,880 dozens of oranges. So rich is the soil and so genial the climate that almost every kind of fruit and vegetables may be grown. The total extent of land leased for pastoral occupation and homestead purposes in 1888 was 202,690 square miles. At Sydney the range of thermometer averages 62.9, about the same as at Madrid; at Bathurst the mean temperature is 58.1, and on the inland plains about 70. The country is well watered, the chief rivers being the Darling and the Lachlan, both tributaries of the Murray, which divides the colony from Victoria. In 1851 the south of the country was formed into the separate colony of Victoria, and in 1859 the northern portion into that of Queensland.

All religions are free, there is no establishment, and all payments are voluntary, with the exception of such as remain due under former arrangements. About two-thirds of the people are Protestants, the greater part members of the Church of England; there are 299,990 Roman Catholics. The See of Sydney, now Metropolitan, was erected in 1836, when it comprised the whole of Australia, but in 1847 took its present designation; the other sees in New South Wales are those of Newcastle, 1847; Goulburn, 1863; Bathurst, 1869; Grafton and Armidale, 1868, and Riverina, 1885; the clergy number about 347. The head of the Roman Catholic Church is His Eminence the Cardinal Archbishop of Sydney, with bishops of Maitland, Bathurst, Armidale, and Goulburn. Presbyterians and Methodists come next, but almost every sect is represented. Education is compulsory; more than one-fourth of the entire population (229,043) attended school in 1888, the gross expenses of the Public Instruction Act and other educational payments amounted to \$2,950,000. The university of Sydney, incorporated in 1851, enjoys a deservedly high reputation; degrees granted there rank with those of Oxford and Cambridge. Of churches and chapels the total number belonging to all denominations was 1,896; but, as Defoe said of England nearly two centuries ago,

"Wherever God erects a house of prayer,
The Devil always builds a chapel there,"

the number of public houses being 3,270, or very nearly two to every church.

"Assisted" emigration from the mother country is for the present suspended. Under the scheme formerly in operation, emigrants were selected by the agent-general in London, but intending emigrants now have to pay for themselves, the ordinary passage money by first-class steamers being: cabin, \$250; intermediate, \$180; or steerage from \$80. Female servants, especially such as could take part in farming and dairy operations, were much in demand. The estimated population on December 31, 1888, was 1,085,740, made up of males, 599,107, and females, 486,633, showing a preponderance of males of no less than 112,474.

The estimated number of aborigines in the colony is, full-blood, 5,689; half-castes, 2,402; total, 8,091.

"Responsible government" was established by the Constitution Act, 18 and 19 Vict., c. 54, and is invested in a governor, appointed by the crown, and a legislative council consisting of 70 members. The legislative assembly consists of 137 members, representing 73 electoral districts; with few exceptions all native-born or naturalized males, twenty-one years of age, who have resided in the district six months, are entitled to the franchise. The voting is by ballot.

Railways, roads, and bridges have their several departments. There were open, December 31, 1888, 2,125 miles of railway, and 55 miles in course of construction; and, at the same date, there were 22,219 miles of telegraph wire, with 460 stations. The post-offices numbered 1,203, the number of letters conveyed was 49,986,000; of newspapers, 35,000,000; and of packets, 6,601,900. There are now 51 miles of tramways open for traffic.

The trade of the country is very large; in 1888 the number of vessels which entered and cleared was 5,927, with a total tonnage of 4,795,419; the value of exports being \$101,000,000; and of imports, \$101,000,000; together, \$205,000,000. The colony possesses seventeen banks, with a paid up capital of \$65,000,000, and total assets, \$220,000,000. Of savings banks there were 351, with deposits amounting to \$20,000,000. The public debt is heavy; on December 31, 1888, it amounted to \$220,000,000, but it was mostly incurred for the construction of railways, telegraphs, and other reproductive public works.

While fully trusting to the ability and willingness of the mother country, the colony has not been altogether unmindful of defense. On December 31, 1888, there were enrolled in the naval and military service of the colony 6,607 men; 939 artillerymen, 96 engineers, 103 submarine miners, 2,117 infantry, 167 mounted infantry, and a reserve force of 2,709, consisting of cavalry, artillery, infantry, and rifle corps. The naval brigade and naval artillery volunteers comprise about 476 officers and men. The officers and men who formed the well-known "Soudan contingent" were selected from these forces.

Sydney, the chief city and capital (12,043 miles from London via the Suez canal), stands on the shore of Port Jackson, surrounded by scenery of surpassing beauty. It extends four miles north and south by three miles east and west, and contains 373 miles of streets with about 39,000 houses, or, including suburbs, a population of about 366,684. About 800 acres have wisely been set aside for parks and open spaces; here are situated the government buildings, royal mint, the university, free public library, observatory, two cathedrals, and numerous churches and chapels. The other large towns with their populations (census, 1881) are Newcastle, 15,600; Bathurst, 7,250; Goulburn, 6,900; Paramatta, 8,440; Maitland E. and W., 7,300; and Grafton, 3,905.

Total revenue in 1888.....	\$45,000,000
Raised by loans.....	11,900,000
Total expenditure.....	56,900,000
Public debt, Dec. 31st, 1888.....	221,000,000
Value of total imports, 1888.....	101,000,000
Imports from United Kingdom, 1888.....	46,000,000
Value of total exports, 1888.....	101,000,000
Exports to United Kingdom, 1888.....	41,000,000

The flora of New South Wales, which comprises about 3,000 species of plants, exclusive of mosses, lichens, fungi, and seaweeds, is characterized by many peculiar forms.

As New South Wales has no natural boundary except the Pacific, there are no organic types which characterize this colony in the same degree as the marsupials, proteads, eucalypts, and acacias distinguish the Australian region as a whole. In this respect

neither do its northern districts differ from South Queensland nor its southern from northeast Victoria, while its west is uniform with the rest of the great continental plain. With this proviso, New South Wales may be justly regarded as the typical region of East Australia. It is made up of three strips, each a sub-region in itself—the coast, the dividing range and its plateaus, and the lower western plains. The coast ranges, bathed by a heated oceanic current, shelter a warm and moist sea margin, in which as far as 34° 40' S. latitude we find jungles of palms, figs, nettle-trees, and a host of other sub-tropical plants, haunted by talegallas, fruit pigeons, flying foxes, etc.; the tablelands enjoy an essentially temperate climate; and in the plains of the interior the scanty rainfall imposes further restrictions on animal and vegetable life.

The indigenous mammals are all marsupial, with the exception of a few bats and rodents, and even among these *Hydromys* is peculiar. This indicates permanent isolation since Mesozoic time. The dingo was doubtless introduced by man, while whales and seals belong to no coast in particular. The dugong (*Halicore*) is not found south of Moreton Bay. Many extinct marsupials, belonging to Australian types, but of gigantic size, as *Diprotodon*, *Nototherium*, *Thylacoleo*, with huge kangaroos, are found in Pleistocene deposits. With them are associated *Thylacinus* and *Sarcophilus*, now restricted to Tasmania. No *Didelphys* occurs, fossil or recent.

Up to the present time but little enterprise has been displayed in developing the extensive sea-fisheries of the colony.

The early history of New South Wales was for many years that of Australasia, and it has little more interest than what pertains to the philosophy of penal settlements. It was a distant prison maintained at the imperial cost. The commercial epoch began when Captain Macarthur found that the climate was suited to the growth of fine wool. The first sheep came from the Cape, mixed with a few from India. He got together a flock of 1,000, and noticed that even in his mongrel flock careful culling and breeding led to a great improvement in the wool, and this set him on considering the importance of having good rams. The fortunate arrival in the colony from the Cape of some fine-wooled sheep of the Escorial breed gave him the opportunity of adding three rams and five ewes to his flock, which he subsequently further improved on a visit to England, by purchasing some of King George III.'s stock at Kew. The stud flock he thus formed, and which was kept at Camden for fifty years, laid the basis of an expansive industry. From that time the colony had an export. The growth of live stock quickly overtook the demands of the local population for meat, and then another colonist, Mr. O'Brien, made the discovery that if sheep were worth nothing for meat they were worth something for tallow, and boiling down became the destiny of all the surplus stock. This waste of meat was suddenly stopped when the next great epoch in the history of the colony was opened up by the discovery of gold. Victoria soon outstripped the mother-colony by its superior attractions in this respect, but New South Wales gained the enormous advantage of having its pastoral industry stimulated and made more profitable. The unoccupied country became worth taking up, till every portion of the territory that was at all occupyable was leased. The political government was at first necessarily a strictly military one, but as the number of freed men and their children increased, and the number of free settlers increased also, the demand for some form of representative government arose, and became irresistible. A legislative council was established, partly

nominate and partly elective. Coincidentally with this grew up a demand that transportation should cease, and the agitation on this question has been the only serious conflict between the colony and the mother-country. It was ended by the mother-country yielding, and transportation was somewhat reluctantly abolished in 1853. At about the same time the mixed legislative council was superseded by the existing parliamentary system of two houses and responsible government, under which the colony has prospered contentedly ever since.

NEWSPAPERS. The authenticated history of newspapers begins in Germany. The earliest plainly *periodical* collection of the "news of the day," as distinguished from the isolated news-pamphlets, is the *Frankfurter Journal*, a weekly publication started by Egenolph Emmel in 1615. Antwerp follows with its *Nieuwe Tijdinghen* of 1616. Six years later came the establishment in London, by Nathaniel Butter and his partners, of a like paper, under the title of *The Weekly News*. All these were the enterprises of "stationers," undertaken in the ordinary way of their trade, and hawked about the streets by itinerating "mercuries." The foundation in Paris, in 1631, of a journal that eventually attained fame as the *Gazette de France*, and which still exists, had a very different origin and different aims. The history of the "leading article" as a great factor in the shaping of public opinion begins with Swift, Defoe, Bolingbroke, and Pulteney, in the many newspapers, from *The Review* and *The Examiner* to *The Craftsman*, by which was waged the keen political strife of the years 1704-40. There is no counterpart to it in France until the Revolution of 1789, nor in Germany until 1796 or 1798. When the *Mercure de France*, after a long period of mediocrity, came into the hands of men of large intellectual faculty, they had the most cogent reasons for exerting their powers upon topics of literature rather than upon themes of politics. True political journalism dates only from the Revolution. It occupied a cluster of writers, some of whom have left an enduring mark upon French literature. A term of high aspiration was followed quickly by a much longer term of frantic license and of literary infamy. Germany has to some extent its parallelisms; but German journalism, if it never soared so high, never sank so low. Journalism in Germany has made steady advances onward; and in one grand feature—that of far-gathered information from foreign countries, not merely of incidents, but the growth of opinion and the state of social life—the leading newspapers of Germany keep much ahead of their best French contemporaries.

In all the other countries of Europe political journalism, in any characteristic sense, is a thing of the present century. The *Ordinarie Post-Tidende* of Stockholm dates from 1643, but until very recent times it was a mere news-letter. Denmark had no sort of journal worth remark until the foundation, in 1749, of the *Berlingske Tidende*, and that, too, attained to no political rank. The *Gazette* of St. Petersburg, which dates from December 16, 1702, is a government organ, and nearly synchronizes with the first successful newspaper in the British colonies in America. Journalism in Italy begins with the *Diario di Roma* in 1716, but in politics the press remained a nullity until nearly the middle of the present century, when the newspapers of Sardinia, at the impulse of Cavour, began to foreshadow the approach of the influential Italian press of the present day. In Spain no rudiments of a newspaper press can be found until the last century. As late as in 1826 an inquisitive American traveler records his inability to lay his hands, during his Peninsular tour, upon more than two Spanish newspapers.

The development of the modern newspaper is due to a union of causes that may well be termed marvelous. A machine that from a web of paper three or four miles long can, in one hour, print, fold, cut, and deliver 24,000 or 25,000 perfected broadsheets is after all not so great a marvel as is the organizing skill which centralizes in one office telegraphic communications from every important town in Europe, Asia, America, and Australia, and which then distributes those communications—directly or indirectly—to thousands of recipients simultaneously, by day and by night, throughout the land. Julius Reuter's enterprise grew immediately out of the thoughts of an observant Prussian government-messenger on the extraordinary excitement which he witnessed during the revolutionary movements of 1848. In 1849 he established a news-transmitting agency in Paris. Between Brussels and Aix-la-Chapelle he formed a pigeon-service, connecting it with Paris and with Berlin by telegraph. As the wires extended, he quickly followed them with agency-offices in many parts of the Continent. When he came to London, his progress was for a moment held in check. The editor of *The Times* ended their interview by saying, "We generally find that we can do our own business better than anybody else can." He went to the office of *The Morning Advertiser*, and had better success. He entered into an agreement with that and afterward with other London journals, including *The Times*, and also with many commercial corporations and firms. The newspapers found great advantage in the use of Reuter's telegrams as supplementary. His enterprise grew apace. In 1865 it was transferred to a limited company. In 1868 the London Press Association was formed. It contracted with Reuter's company to supply their telegrams exclusively throughout the United Kingdom, London only excepted. In connection with the intelligence department of the postoffice, the Association supplies parliamentary, judicial, and market news. The enterprise was organized by Mr. John Lovell, now editor of *The Liverpool Mercury*. London has now at least nine other press and telegraphic associations; Paris probably has almost as many.

The first English journalists were the writers of "news-letters," originally the dependents of great men, each employed in keeping his own master or patron well informed, during his absence from court, of all that transpired there. The duty grew at length into a calling. The writer had his periodical subscription list, and, instead of writing a single letter, wrote as many letters as he had customers. Of the earlier news-letters good examples may be seen in Sir John Fenn's collection of *Paston Letters*, and in Arthur Collins' *Letters and Memorials of State*. Of those of later date, specimens will be found in Knowler's *Letters and Despatches of Strafford*, and such as have a very high historical interest may be seen in abundance among the papers collected by the historian Thomas Carte, now preserved in the Bodleian Library at Oxford. Although no genuine newspaper of the sixteenth century can be produced, English pamphlets, as well as French, Italian, and German, occur with such titles as *News from Spaine*, and the like. In the early years of the seventeenth century they became very numerous. The most eminent purveyors of reading of this sort were Nathaniel Butter, Nicholas Bourne, and Thomas Archer; and by them was issued, in May, 1622, the first authentic English periodical newspaper now known to exist. It is entitled "The 23d of May—*The Weekly News from Italy, Germany, &c.*, London, printed by J. D. for Nicholas Bourne and Thomas Archer." Nathaniel Butter's name does not occur on this number, but on

many subsequent numbers it appears in connection sometimes with Bourne's and sometimes with Archer's name, so that there was probably an eventual partnership in the new undertaking. November, 1641, is especially noticeable for the publication, in the form of a newspaper, of the earliest authentic report of the proceedings of parliament. It was a weekly periodical, and sometimes contained ordinary news in addition to its staple matter. This was followed, within five years, by a long train of newspapers, most of which were published weekly. Those which stand out most saliently from the rest are the *Mercurius Britannicus*, *M. Pragmaticus*, and *M. Politicus*, of Marchmont, Needham, and the *Mercurius Aulicus* of John Birkenhead.

Birkenhead's *M. Aulicus* was also begun in 1643, and continued, although irregularly, until nearly the close of the civil war. Under Cromwell, the chief papers were *M. Politicus* and *The Public Intelligencer*. These publications were issued on different days of the week, and at length they became conjointly the foundation of the present *London Gazette*. After the Restoration, an office of surveyor of the press was instituted, to which Roger L'Estrange was appointed. He continued the papers above mentioned, but changed their titles to *The Intelligencer* and *The News*.

Joseph Williamson was for a time L'Estrange's assistant in the compilation of *The Intelligencer*, from which he soon withdrew, and organized for himself a far-spread foreign correspondence, and carried on the business of a news-letter writer on a larger scale than had till then been known. The first number of *The Oxford Gazette* was published on November 14, 1665. With the publication of the twenty-fourth number it became *The London Gazette*. Williamson had the general control of it. For a considerable time Charles Perrot, a member of Oriel College, was the acting editor. From such humble beginnings has arisen the great repertory of State Papers, now so valuable to the writers and to the students of English history. It has appeared twice a week, in a continued series, for nearly two hundred and twenty years. The editorship, a government appointment, is now commonly given in reward of distinguished service upon the ordinary newspaper press.

In November, 1675, L'Estrange—not yet tired of journalism—commenced *The City Mercury or Advertisements Concerning Trade*. This he followed up in 1679 by *Domestick Intelligence, published gratis for the promotion of Trade*.

The day after the departure of James II. was marked by the appearance of three newspapers—*The Universal Intelligence*, *The English Courant*, and *The London Courant*. Within a few days more these were followed by *The London Mercury*, *The Orange Gazette*, *The London Intelligencer*, *The Harlem Currant*, and others. The Licensing Act, which was in force at the date of the Revolution, expired in 1692, but was continued for a year, after which it finally ceased. On the appearance of a paragraph in *The Flying Post* of April 1, 1697, which appeared to the House of Commons to attack the credit of the Exchequer Bills, leave was given to bring in a bill "to prevent the writing, printing, or publishing of any news without license;" but the bill was thrown out in an early stage of its progress.

In 1696 Edward Lloyd—the virtual founder of the "Lloyd's" of commerce—started a thrice-a-week paper, *Lloyd's News*, which had a brief existence, but was the precursor of the *Lloyd's List* of the present day. It was in the reign of Queen Anne that the newspaper press first became really eminent for the amount of intellectual power and of versatile talent which was employed upon it. It was also in that reign that the press

was first fettered by the newspaper stamp. The accession of Anne was quickly followed by the appearance of the first successful London daily newspaper, *The Daily Courant* (1703). Seven years earlier, in 1695, *The Postboy* had been started as a daily paper, but only four numbers appeared. The *Courant* was published and edited by the well-known and learned printer Samuel Buckley. Then came a crowd of new competitors for public favor, of less frequent publication. The first number of one of these, *The Country Gentleman's Courant* (1706), was given away gratuitously.

On February 19, 1704, while still imprisoned in Newgate for a political offense, Defoe began his famous paper *The Review* (see DEFOE). At the outset it was published weekly, afterward twice, at length three times a week, and continued substantially in its first form until July 29, 1712.

The increasing popularity and influence of the newspaper press could not fail to be distasteful to the government of the day. Prosecutions were multiplied, but with small success. At length some busy projector hit upon the expedient of a newspaper tax. The duty eventually imposed was a halfpenny on papers of half a sheet or less, and a penny on such as ranged from half a sheet to a single sheet, and it came into force on July 19, 1712. In 1776 the number of newspapers published in London alone had increased to fifty-three. The history of newspapers during the long reign of George III. is a history of criminal prosecutions, in which individual writers and editors were repeatedly defeated and severely punished, while the press itself derived new strength from the protracted conflict, and turned ignominious penalties into signal triumphs. The three metropolitan newspapers which at different periods of this reign stood preëminent among their competitors were *The Public Advertiser*, *The Morning Post*, and *The Morning Chronicle*. The *Public Advertiser* was first published in 1726, under the title *London Daily Post and General Advertiser*. In 1738 the first part of the title was dropped, and in 1752 *General Advertiser* was altered into the name which the letters of Junius made so famous. It continued to appear until 1798, and was then amalgamated with the commercial paper called *The Public Ledger*, which still exists as a London daily journal. *The Morning Chronicle* was begun in 1769. William Woodfall was its printer, reporter, and editor, and continued to conduct it until 1789. It was sold in 1823 to Mr. Clement, the purchase-money amounting to \$210,000. Mr. Clement held it for about eleven years, and then sold it to Sir John Easthope for \$80,000. It was then, and until 1843, edited by John Black, who numbered among his staff Albany Fonblanque, Charles Dickens, and John Payne Collier. The paper continued to be distinguished by much literary ability, but not by commercial prosperity. In 1849 it became the joint property of the duke of Newcastle, Mr. Gladstone, and some of their political friends; and by them, in 1854, it was sold, conditionally, to Mr. Serjeant Glover, under whose management it became eventually the subject of a memorable public scandal in the law courts of France. At length the affairs of the *Chronicle* were wound up in the Bankruptcy Court of London, after an existence of more than ninety years.

The Morning Post dates from 1772. For some years it was in the hands of Henry Bate (afterward known as Sir Henry Bate Dudley), and it attained some degree of temporary popularity, though of no very enviable sort. In 1795 the entire copyright, with house and printing materials, was sold for \$3,000 to Peter and Daniel Stuart, who quickly raised the position of the *Post* by enlisting Mackintosh and Coleridge in its service, and also by giving unremitting attention to adver-

tisements and to the copious supply of incidental news and amusing paragraphs. It is a striking testimony, not only to Coleridge's powers as a publicist, but to the position which the newspaper press had won, in spite of innumerable obstacles, eighty years ago. The list of his fellow-workers in the *Post* is a most brilliant and varied one. Besides Mackintosh, Southey, and Arthur Young, it included a galaxy of poets. Many of the lyrics of Moore, many of the social verses of Mackworth Praed, some of the noblest sonnets of Wordsworth, were first published in the columns of the *Post*.

The Times is usually dated from January 1, 1788, but was really commenced on January 18, 1785, under the title of *The London Daily Universal Register*, printed logographically.

Within two years Walter, the editor, had his share in the Georgian persecutions of the press, by successive sentences to three fines and to three several imprisonments in Newgate, chiefly for having stated that the prince of Wales and the dukes of York and Clarence had so misconducted themselves "as to incur the just disapprobation of his Majesty." In 1803 he transferred the management (together with the joint proprietorship) of the journal to his son, by whom it was carried on with remarkable energy and consummate tact. Walter, however, was strong and resolute enough to brave the government. He organized a better system of news transmission than had ever before existed. He introduced steam-printing, and repeatedly improved its mechanism.

The effort to secure for *The Times* the best attainable literary talent in all departments kept at least an equal pace with those which were directed toward the improvement of its mechanical resources.

Sir John Stoddart, afterward governor of Malta, edited *The Times* for several years prior to 1816. He was succeeded by Thomas Barnes, under whose management the great journal became famous for munificent reward of every kind of efficient service. From 1841 to 1877 the chief editor was John Thaddeus Delane. Mr. Delane was followed by Thomas Chenery, who remained in charge until 1884, and was in turn succeeded by the present incumbent.

For a long period after the establishment of *The Times*, no effort to found a new daily London morning newspaper was successful. Setting aside mere class journals like *The Financier* and *The Sportsman*, the only existing London morning newspapers which have been founded during the present century are *The Daily News* (January 21, 1846), *The Daily Telegraph* (June 29, 1855), and *The Standard* (June 29, 1857).

London possessed no daily evening paper until 1788, nor did any evening paper attain an important position until the period of the war with Napoleon, when *The Courier* (established in 1792) became the newspaper of the day. For a few years its circulation exceeded that of *The Times*. London has now seven evening papers, one of which—*The Shipping and Mercantile Gazette*—is exclusively commercial. While, of the distinctively political morning journals, four are Liberal and only two Conservative, of the six political evening ones, four are Conservative (*Globe*, dating from 1803; *Evening Standard*, 1827; *St. James's Gazette*, 1880; *Evening News*, 1881) and two are Liberal (*Pall Mall Gazette*, 1865; and *The Star*, 1887).

The annals of French journalism begin with the *Gazette*, established by Théophraste Renaudot in 1631, under the patronage of Richelieu, and with his active coöperation.

In 1790 the sale of the *Mercur* (established in Paris as the *Mercur Galant*, in 1672), rose very rapidly. It attained for a time a circulation of 13,000 copies. Mira-

beau style: it in debate "the most able of newspapers." Great pains were taken for the collection of statistics and state papers, the absence of which from the French newspaper press had helped to depress its credit as compared with the political journalism of England and to some extent of Germany. But, after August 10, 1792, its publication was suspended.

All this time the *Moniteur* (*Gazette Nationale, ou le Moniteur Universel*) was under the same general management as the *Mercure Française* (so the title had been altered in 1791). The *Moniteur*, however, kept step with the majority of the assembly, the *Mercure* with the minority.

The journalism of the first Revolution has been the theme of many bulky volumes, and their number is still on the increase. The recital of the mere titles of the newspapers which then appeared throughout France fills more than forty pages of larger dimensions than those which the reader has now before him.

In August, 1789, Baudouin began the *Journal des Débats* (edited in 1792 by Louvet) and Marat the *Ami du Peuple* (which at first was called *Le Publiciste Parisien*). The *Moniteur Universel* was first published on November 24th, although numbers were afterward printed bearing date from May 5th, the day on which the states-general first assembled. Camille Desmoulins also commenced his *Révolutions de France et de Brabant* in November, 1789. The *Ami du Roi* was first published in June, 1790, *La Quotidienne* in September, 1792. Of all these prominent journals the *Moniteur* and the *Débats* alone have survived until now.

The consular government began its dealings with the press by reducing the number of political papers to thirteen. At this period the number of daily journals had been nineteen, and their aggregate provincial circulation, apart from the Paris sale, 49,313, an average of 2,600 each.

Under Napoleon the *Moniteur* was the only political paper that was really regarded with an eye of favor. The cheap journalism of Paris began in 1836 (July 1st) with the journal of Girardin, *La Presse*, followed instantly by *Le Siècle*, under the management of Dutacq, to whom, it is said—not incredibly—the original idea was really due.

The rapid growth of the newspaper press of Paris under Louis Philippe will be best appreciated from the fact that, while in 1828 the number of stamps issued was 28,000,000, in 1836, 1843, 1845, and 1846 the figures were 42,000,000, 61,000,000, 65,000,000, and 79,000,000 respectively. At the last-mentioned date the papers with a circulation of upward of 10,000 were (besides the *Moniteur*, of which the circulation was chiefly official and gratuitous) as follows:—*Le Siècle*, 31,000; *La Presse*, and *Le Constitutionnel*, between 20,000 and 25,000; *Journal des Débats* and *L'Epoque*, between 10,000 and 15,000.

In 1858 the order of the six leading Parisian papers in point of circulation was: (1) *Siècle*, (2) *Presse*, (3) *Constitutionnel*, (4) *Patrie*, (5) *Débats*, (6) *Assemblée Nationale*. The number of provincial papers exceeded 500.

The principal Parisian newspapers in 1890 may be classified thus:—

a. Organs of the Legitimists, and of the Church of France: *Gazette de France*, *Le Monde*, *L'Union*, *La Defense*, *La Civilisation*, *L'Univers*.

b. Orleanist organs: *Le Moniteur Universel*, *Le Constitutionnel*, *Le Français* (under the auspices of the Duc de Broglie), *Le Soleil*.

c. Bonapartist organ: *Le Pays* (edited at one time by Lamartine).

d. Republican organs: *Journal des Débats*, *Le Temps* (the paper of the republican middle classes, and read largely by Protestants), *Le Siècle* (now of declining importance, Voltairean in tone), *Le XIX. Siècle* (also Voltairean), *La Paix* (M. Grévy's paper), *La Justice*, *Paris*, *La République Française* (founded in 1871 by Gambetta), *Le Parlement* (founded by Dufaure; circulation less than that of *La République*, but political weight considerable).

Printed newspapers in Germany begin with the *Frankfurter Journal*, established in the year 1615, by Egenolph Emmel, a bookseller of Frankfort-on-Main. On the whole, it may be said that the German newspapers were of very small account until after the outbreak of the French Revolution. Nor, indeed, can any journal of a high order be mentioned of prior appearance to the *Allgemeine Zeitung*, founded at Leipsic by the bookseller Cotta (at first under the title of *Neueste Weltkunde*) in 1798, and which is still at the head of the political press of Germany.

In 1879 it was estimated that the total number of newspapers and periodicals published in the German language, in all parts of the world, reached to nearly 5,480—in Germany proper, 3,780; Austria-Hungary, about 700; Switzerland, about 300; Russia, about 50; Great Britain, Netherlands, Belgium, Italy, etc., 40; North America, 600; South America, 9; Africa (Cape Town), 1. In Germany, in foreign languages, there appeared at the same period—in Polish, 26; French, 17; Danish, 10; Wendish, 6; Lithuanian, 2; English, 2; Hebrew, 4; total, 67.

The *National Zeitung*, published at Berlin, holds a conspicuous place among existing German newspapers. Dr. Bernhard Wolff, who founded it (also in 1848), continued to be chief editor until his death in 1879. He was a notable precursor (only a little in advance) in telegraphic enterprise of Julius Reuter; and, to some extent, his telegraphic bureau at Berlin may be regarded as the germ at once of the "Agence Havas" and of "Reuter's telegrams." Like Reuter, he found it expedient, as the affair grew, to turn it over to a company. He did so in 1864, but continued to work the enterprise until 1871. Of strictly political papers, the *Volkszeitung* is probably that which has the largest circulation of all Germany.

As regards the socialistic press, "German socialism," says Sorel, "has turned journalist. It has established fourteen printing-offices, and publishes forty-one political journals, thirteen of which are of daily publication."

At the beginning of 1840 the whole number of Austro-German and Hungarian periodicals, of all sorts, was less than 100, only twenty-two being (after a fashion) political newspapers; and of these nearly all drew their materials and their inspiration from the official papers of Vienna (*Wiener Zeitung* and *Oesterreichischer Beobachter*). These two were all that appeared in the capital.

Vienna has in all eighteen daily newspapers (really such), ten of which range in average circulation from 14,000 to 54,000 copies, and, according to the consular returns collected by Hubbard, no less than 483 periodicals of all kinds, and of all periods of issue. Of 1,016 journals, classified as to language, 600 appear in German, 170 in Hungarian, 79 in Bohemian, 58 in Polish, 56 in Italian, 22 in Slovenian, 11 in Croatian and Servian, 9 in Ruthenian, 8 in Roumanian, 3 in Hebrew. Budapest claims to have 229 journals, and Prague 99, counting those of all descriptions.

Boston was the first city of America that possessed a local newspaper; but the earliest attempt in that direction, made in 1689, and a second attempt under the title *Publick Occurrences* which followed in September,

1690, were both suppressed by the government of Massachusetts. *The Boston Gazette* began in 1719. James Franklin, elder brother of the celebrated Benjamin Franklin, was its first printer. It lasted until the end of 1754, its editorship usually changing with the change of the postmasters. On August 17, 1721, James Franklin started *The New England Courant*, the publication of which ceased in 1727; and two years later Benjamin Franklin established *The Pennsylvania Gazette*, which he continued weekly until 1765.

To *The Boston Gazette* and the *Courant* succeeded *The New England Weekly Journal* (March 20, 1727; incorporated with *The Boston Gazette* in 1741), and *The Weekly Rehearsal* (September 27, 1731), which became *The Boston Evening Post* (August, 1735), and under that title was for a time the most popular of the Boston newspapers.

William Lloyd Garrison's once well-known *Boston Liberator* was founded on New Year's Day, 1831. For a time its editor was also writer, compositor, and pressman. He continued the paper to the last day of 1861, and lived to witness the abolition of negro slavery.

At the commencement of the struggle for independence in 1775 Massachusetts possessed seven newspapers, New Hampshire one (*The New Hampshire Gazette*, founded in 1756), Rhode Island two, and Connecticut three—making thirteen in all for the New England colonies. Pennsylvania had eight, of which the earliest in date was *The American Weekly Mercury* (No. 1, December 22, 1719); and New York but three, the oldest of them being *The New York Gazette*, the publication of which had commenced on October 16, 1725. Up to that period (1725) Boston and Philadelphia were the only towns possessing a newspaper throughout America. The total number of Anglo-American papers was thirty-four, and all of them were of weekly publication.

The New Hampshire Gazette still exists, and is the "father" of the New-England press.

Virginia, notwithstanding its illustrious precedency—the province of Raleigh, the cradle of Washington—possessed neither newspaper nor printing-office until 1736, so that (as respects one-half at least of the wish) there was once a prospect that the devout aspiration of Sir William Berkeley might be realized, "Thank God," said this Virginian governor in 1671, "we have neither free school nor printing press, and I hope may not have for a hundred years to come." The earliest journal established in the State was *The Virginia Gazette*, commenced in 1736. *The Richmond Inquirer*, which started in 1804, early attained a leading position. The first daily newspaper published in the city or State of New York was *The New York Journal and Register*, commenced in 1788. In 1810 the aggregate number of papers published within the State was sixty-six, of which fourteen belonged to New York city. Ten years later the city press included eight daily journals, with an aggregate daily circulation of 10,800 copies. No one paper circulated more than 2,000, and but two—*The Evening Post* and *The Commercial Advertiser*—attained that number.

The penny press of America began in New York, and the pioneer was *The Daily Sun* (No. 1, September 23, 1833), written, edited, set up, and worked off by Benjamin Franklin Day, a journeyman printer. Its circulation at first was 600 copies. *The New York Herald* followed in May, 1835. Exceptional and eccentric forms of advertisement were persistently used to gain notoriety for the new paper, and its commercial success was great. Within twenty years it had attained a circulation of 36,158 copies—which was at that date about five times the circulation of any London newspaper, *The*

Times only excepted—and the issue has since greatly increased. *The New York Tribune* was established in 1841 by Horace Greeley, who remained its editor and one of its proprietors until his death, shortly after his defeat for the presidency in 1872. It was also, at the outset, a penny paper, but it differed from its cheap rivals in being a vigorous political propagandist, and in giving hospitable attention to literature and to novel ideas in social and political economy. The *Tribune* made the first great use of the Atlantic cables for transmitting war correspondence, in its voluminous reports of the Franco-Prussian war. Another of its notable feats was the translation of the "cipher dispatches," revealing the effort by some of Mr. Tilden's partisans to purchase electoral votes for him, in the disputed presidential election of 1876. *The New York Times* was established by Henry J. Raymond in September, 1851. Its greatest good fortune came after the death of its founder, in its discovery and vigorous exposure of the frauds and robberies committed by the "Tweed Ring," in the municipal government of New York, a work for which it received great praise and profit.

The prices of the more important New York papers were advanced to three, and finally, during the war of the Rebellion, to four cents. They all came to make regular issues on Sunday also, when the price was generally five cents. In September, 1883, the *Times* suddenly reduced its price from four to two cents. The *Herald* did the same; but the *Tribune* stopped at three cents. There are also several one-cent papers, with considerable circulations. Their inroads upon the larger journals, and that from the *World*, an eight-page Democratic newspaper sold at two cents, are supposed to have forced the reductions in price above named, which are obviously to make a great change both in the character and prosperity of the press of New York.

The New York Associated Press is the chief news agency of the American continent. It is a partnership between the *Herald*, *Tribune*, *Times*, *Sun*, *World*, *Journal of Commerce*, and *Mail and Express*, for the collection of such news as its members may wish to use in common, and the sale of it to others. This and the Western Associated Press—an organization of a large number of the more important newspapers of Chicago, Cincinnati, St. Louis, and other cities in the Mississippi valley—are now consolidated in a working arrangement, under the management of a permanent joint executive committee, who appoint agents, contract with telegraph companies, distribute the news to the members of the two associations, and sell it to a great number of individual papers and other associations. They transmit proceedings of Congress and the State legislatures, public documents, market news, the dispatches by ocean cables, and, in general, accounts of all public occurrences of interest.

Until the reductions of 1883, the prevailing price for first-class papers, of eight or more pages, was, in New York, four cents; in Chicago, Cincinnati, St. Louis, and elsewhere, five cents. The past ten years, however, had been notable for the growth of another class of journals, of about half the size, generally of only four pages, which aimed at a greater condensation of routine news, and often at giving special prominence to "sensations." These were sold at two cents, and frequently attained great success. The New York *Sun*, Boston *Herald*, Philadelphia *Times*, Chicago *News*, and San Francisco *Chronicle* were good examples. Equally successful, if generally less sensational, were the Philadelphia *Ledger*, Baltimore *Sun*, Washington *Star*, and San Francisco *Call*. The wide circulation and handsome profits of this class of journals have developed a considerable reaction against large papers, extreme full

ness of news detail, and long editorial comment. Most of the newspapers started or projected now are of this two-cent class.

The great distances in the United States, the excellent and cheap telegraphic service, and the facilities afforded by the Associated Press combine to promote the growth of what would be called in England "provincial journals." Cincinnati, Chicago, and St. Louis, being each over a day's and a night's journey from New York, Boston, or Philadelphia, are able to build up first-class papers of their own. In Chicago the *Tribune*, *Times*, *Inter-Ocean*, and *Herald* are all strong and enterprising eight-page journals, often sending out double or sixteen-page sheets, maintaining large corps of correspondents, and leasing private wires from New York and Washington. Substantially the same may be said of the *Commercial Gazette* and the *Enquirer* of Cincinnati, of the *Globe-Democrat* and the *Republic* of St. Louis, and of the *Times-Democrat* of New Orleans.

Nearly every town of 15,000 inhabitants has its own daily paper. Scarcely a "county seat" in the settled part of the United States is without its weekly paper—even if the population should be below 1,000. In the older counties, villages of a few hundred inhabitants in the "out-townships" are also apt to have a weekly. These are often of the class known as "patent outsides," for which the first and fourth pages, composed of reprint matter and advertisements, are made up and printed in a central office, doing such work by wholesale for hundreds of papers, while the half-printed sheets are then forwarded to the local office, to be filled out with village news and advertisements.

The total number of periodical publications issued in the United States and Canada is reported at almost 18,000 (16,310 in 1888). Of these there are nearly 1,600 dailies and over 13,000 weeklies. New York, Pennsylvania, and Illinois in their order lead in the number of newspapers.

NEWTON, a city in Middlesex county, Mass., about eight miles west of Boston, on the south bank of the Charles river. It is divided into seven wards, and contains the post-villages of Auburndale, Chestnut Hill, Newton, Newton Centre, Newton Highlands, Newton Lower Falls, Newton Upper Falls, Newtonville, West Newton, and Nonantum. Newton is principally inhabited by Boston merchants, and, each village being a collection of fine residences with beautiful grounds, it has been designated "the Garden City of New England." The water-power furnished by the river is turned to account by numerous manufactories producing paper, hosiery, dyestuffs, emery paper, ink, soap, shoddy, etc. The first Baptist theological seminary in America was established in Newton Centre in 1826; it is now a flourishing institution with a library of 15,000 volumes, and five resident professors. Laselle Female Seminary at Auburndale dates from 1851. First settled in 1630, Newton was incorporated as a town in 1679, as a city in 1873. Its population was 3,351 in 1840, 8,382 in 1860, 12,825 in 1870, and 24,379 in 1890.

NEWTON, a town of Harvey county, Kan., twenty-seven miles north of Wichita, with a population (1890) of 5,602. It has good railroad and telegraph facilities, banks, schools, and churches, and is the central point of an important coal-field.

NEWTON, SIR ISAAC, one of the greatest of natural philosophers, was born December 25, 1642 (O.S.), at Woolsthorpe, a hamlet in the parish of Colsterworth, Lincolnshire, about six miles from Grantham. His father (also Isaac Newton) was the farmer of a small freehold property of his own. After having acquired the rudiments of education at two small schools in ham-

lets in close proximity to Woolsthorpe, Newton was sent at the age of twelve to the grammar school of Grantham, in the house of Mr. Clark. According to his own confession he was far from industrious, and stood very low in his class. His mother's brother, Mr. W. Ayscough, the rector of the next parish, was a graduate of Trinity College, Cambridge, and when he found that Newton's mind was wholly devoted to mechanical and mathematical problems, he urged upon his mother the desirability of sending her son to his own college, a proposal to which she was not at all unwilling to give her consent. He was accordingly admitted a member of Trinity College on June 5, 1661, as a subsizar, and was matriculated on July 8th. We have scarcely any information as to his attainments when he commenced residence, and very little as to his studies at the university before he took the degree of bachelor of arts. It is reported that in his examination for a scholarship at Trinity, to which he was elected on April 28, 1664, he was examined in Euclid by Dr. Barrow, who formed a poor opinion of his knowledge, and that in consequence Newton was led to read the *Elements* again with care, and thereby to form a more favorable estimate of Euclid's merits.

The study of Descartes' *Geometry* seems to have inspired Newton with a love of the subject, and to have introduced him to the higher mathematics. In the month of January, 1665, Newton took the degree of bachelor of arts.

Newton was elected a fellow of his college on October 1, 1666. There were nine vacancies, one of which was caused by the death of Cowley in the previous summer, and the nine successful candidates were all of the same academical standing. A few weeks after his election to a fellowship Newton went to Lincolnshire, and did not return to Cambridge till the February following. On March 16, 1668, he took his degree of M.A.

During the years 1666 to 1669 Newton's studies were of a very varied kind. It is known that he purchased prisms and lenses on two or three several occasions, and also chemicals and a furnace, apparently for chemical experiments; but he also employed part of his time on the theory of fluxions and other branches of pure mathematics. He wrote a paper, *Analysis per Equationes Numero Terminorum Infinitas*, which he put, probably in June, 1669, into the hands of Isaac Barrow (then a fellow of Trinity College, and the first occupant of the Lucasian chair of mathematics). Shortly afterward Barrow, who had resolved to devote his attention to theological in preference to mathematical studies, resigned the Lucasian chair, and was instrumental in securing Newton's election as his successor. Newton was elected Lucasian professor on October 29, 1669. It was his duty as professor to lecture at least once a week in term time on some portion of geometry, arithmetic, astronomy, geography, optics, statistics, or some other mathematical subject, and also for two hours in the week to allow an audience to any student who might come to consult with the professor on any difficulties he had met with. The subject which Newton chose for his lectures was optics. On December 21, 1671, he was proposed as a candidate for admission into the Royal Society by Dr. Seth Ward, bishop of Salisbury, and on January 11, 1672, he was elected a fellow of the Society.

It is supposed that it was at Woolsthorpe, in the summer of 1666, that Newton's thoughts were directed to the subject of gravity. Voltaire is the authority for the well-known anecdote about the apple. He had his information from Newton's favorite niece, Catharine Barton, who married Conduitt, a fellow of the Royal

Society, and one of Newton's intimate friends. How much truth there is in what was a plausible and a favorite story can never be known, but it is certain that tradition marked a tree as that from which the apple fell, till 1820, when, owing to decay, the tree was cut down and its wood carefully preserved.

In January, 1684, Sir Christopher Wren, Halley, and Hooke were led to discuss the law of gravity, and, although probably they all agreed in the truth of the law of the inverse square, yet this truth was not looked upon as established. It appears that Hooke professed to have a solution of the problem of the path of a body moving around a center of force attracting as the inverse square of the distance; but Halley, finding, after a delay of some months, that Hooke "had not been so good as his word" in showing his solution to Wren, started, in the month of August, 1684, for Cambridge to consult Newton on the subject. Without mentioning the speculations which had been made, he went straight to the point and asked Newton what would be the curve described by a planet around the sun on the assumption that the sun's force diminished as the square of the distance. Newton replied promptly, "an ellipse," and on being questioned by Halley as to the reason for his answer he replied, "Why, I have calculated it." He could not, however, put his hand upon his calculation, but he promised to send it to Halley. After the latter had left Cambridge, Newton set to work to reproduce the calculation. After making a mistake and producing a different result he corrected his work and obtained his former result.

The years 1685 and 1686 will ever be memorable in the history of science. It was then that Newton first composed almost the whole of his great work. During this period Newton had a very extensive correspondence with Flamsteed, who was then the astronomer-royal. Many of the letters are lost, but it is clear from one of Newton's, dated September 19, 1685, that he had received many useful communications from Flamsteed, and especially regarding Saturn, "whose orbit, as defined by Kepler," Newton "found too little for the sesquialterate proportions." In the other letters written in 1685 and 1686 he applies to Flamsteed for information respecting the orbits of the satellites of Jupiter and Saturn, respecting the rise and fall of the spring and neap tides at the solstices and the equinoxes, respecting the flattening of Jupiter at the poles (which, if certain, he says, would conduce much to the stating the reasons of the precession of the equinoxes), and respecting the difference between the observed places of Saturn and those computed from Kepler's tables about the time of his conjunction with Jupiter. On this last point the information supplied by Flamsteed was peculiarly gratifying to Newton; and it is obvious from the language of this part of the letter that he had still doubts of the universal application of the sesquialteral proportion.

Upon Newton's return from Lincolnshire in the beginning of April, 1685, he seems to have devoted himself to the preparation of his work. In the spring he had determined the attractions of masses, and thus completed the law of universal gravitation. In the summer he had finished the second book of the *Principia*, the first book being the treatise *De Motu*, which he had enlarged and completed. Excepting in the correspondence with Flamsteed, to which we have already referred, we hear nothing more of the preparation of the *Principia* until April 21, 1686, when Halley read to the Royal Society his *Discourse Concerning Gravity and its Properties*, in which he states "that his worthy countryman Mr. Isaac Newton has an incomparable treatise of motion almost ready for the press," and that the law of the inverse square "is the principle on which Mr. New-

ton has made out all the phenomena of the celestial motions so easily and naturally that its truth is past dispute." The intelligence thus given by Halley was speedily confirmed. At the very next meeting of the Society, on April 28th, "Doctor Vincent presented to the Society a manuscript treatise entitled *Philosophiæ Naturalis Principia Mathematica*, and dedicated to the Society by Mr. Isaac Newton."

On June 30, 1686, the president was desired by the council to license Mr. Newton's book, entitled *Philosophiæ Naturalis Principia Mathematica*. The printing of the *Principia* was commenced, and went on with considerable regularity. The second book, though ready for the press in the autumn of 1686, was not sent to the printers until March, 1687. The third book was presented to the Society on April 6, 1687, and the whole work published about midsummer in that year. It was dedicated to the Royal Society, and to it was prefixed a set of Latin hexameters addressed by Halley to the author. The work, as might have been expected, caused a great deal of excitement throughout Europe, and the whole of the impression was very soon sold. In 1691 a copy of the *Principia* was hardly to be procured.

The active part which Newton took in defending the legal privileges of the university against the encroachments of the crown had probably at least equal weight with his scientific reputation when his friends chose him as a candidate for a seat in parliament as one of the representatives of the university. Newton retained his seat only about a year, from January, 1689, till the dissolution of the Convention Parliament in February, 1690. During this time Newton does not appear to have taken part in any of the debates in the House; but he was not neglectful of his duties as a member. On April 30, 1689, he moved for leave to bring in a bill to settle the charters and privileges of the university of Cambridge, just as Sir Thomas Clarges did for Oxford at the same time, and he wrote a series of letters to Dr. Lovel, the vice-chancellor of the university, on points which affected the interests of the university and its members.

During his residence in London Newton had made the acquaintance of John Locke. Locke had taken a very great interest in the new theories of the *Principia*. He was one of a number of Newton's friends who began to be uneasy and dissatisfied at seeing the most eminent scientific man of his age left to depend upon the meager emoluments of a college fellowship and a professorship.

At one time Newton's friends had nearly succeeded in getting him appointed provost of King's College, Cambridge, but the college offered a successful resistance on the ground that the appointment would be illegal, as the statutes required that the provost should be in priest's orders. Charles Montague, who was afterward earl of Halifax, was a fellow of Trinity College, and was a very intimate friend of Newton's; and it was on his influence that Newton relied in the main for promotion to some post of honor and emolument. His hopes, however, were blighted by long delay. But this blot upon the English name was at last removed by Montague in 1694, when he was appointed chancellor of the exchequer. He had previously consulted Newton upon the subject of the recoinage, and on the opportunity occurring he appointed Newton to the post of warden of the mint. The chemical and mathematical knowledge of Newton proved of great use in carrying out the recoinage. This was completed in about two years, and such was the zeal and devotion with which Newton discharged the laborious duties of his office that he was in 1697 appointed to the mastership of the mint, a post worth between \$6,000 and \$7,500 per annum. While he held the latter office,

Newton drew up a very extensive table of assays of foreign coins, and composed an official report on the coinage.

Up to the time of the publication of the *Principia* in 1687 the method of fluxions which had been invented by Newton, and had been of great assistance to him in his mathematical investigations, was still, except to Newton and his friends, a secret. One of the most important rules of the method forms the second lemma of the second book of the *Principia*.

In the year 1707 Whiston published the algebraical lectures which Newton had delivered at Cambridge, under the title of *Arithmetica Universalis, sive de Compositione et Resolutione Arithmetica Liber*. In mentioning the mathematical works of our author, we must not omit his solution of the celebrated problems proposed by John Bernoulli and Leibnitz. In the year 1699 Newton's position as a mathematician and natural philosopher of the first order was recognized in a very honorable manner by the French Academy of Sciences. In that year the Academy was remodeled, and eight foreign associates were created.

While Newton held the office of warden of the mint, he retained his chair of mathematics at Cambridge, and discharged the duties of the post, but shortly after he was promoted to the more lucrative office of master of the mint he appointed Whiston his deputy with "the full profits of the place." Whiston began his astronomical lectures as Newton's deputy in January, 1701. On December 10, 1701, Newton resigned his professorship, thereby at the same time resigning his fellowship at Trinity, which he had held with the Lucasian professorship since 1675 by virtue of the royal mandate. Whiston's claims to succeed Newton in the Lucasian chair were successfully supported by Newton himself.

On November 26, 1701, Newton was again elected one of the representatives of the university in parliament, but he retained his seat only until the dissolution in the following July.

In the autumn of 1703 Lord Somers retired from the post of president of the Royal Society, and Newton on November 30, 1703, was elected to succeed him. Newton was annually reelected to this honorable post during the remainder of his life. He held the office in all twenty-five years, a period in which he has been exceeded by but one other president of the Royal Society, Sir Joseph Banks. In April, 1705, when Queen Anne and the court were staying at the royal residence at Newmarket, they paid a visit to Cambridge, where they were the guests of Doctor Bentley, the master of Trinity. Her majesty went in state to the Regent House, where a congregation of the senate was held, and a number of honorary degrees conferred. Afterward the queen held a court at Trinity Lodge, where (April 16, 1705) she conferred the order of knighthood upon the most distinguished of her subjects, the noblest knight who ever won his spurs in science, Sir Isaac Newton.

As soon as the first edition of the *Principia* was published Newton began to prepare for a second edition. He was anxious to improve the work by additions to the theory of the motion of the moon and the planets. At last, about midsummer, 1713, was published the long and impatiently expected second edition of the *Principia*, and on July 27th Newton waited on the queen to present her with a copy of the new edition.

In 1714 the question of finding the longitude at sea, which had been looked upon as an important one for several years, was brought into prominence by a petition presented to the House of Commons by a number of captains of Her Majesty's ships and merchant-ships and of London merchants. This petition set forth "that

the discovery of longitude is of such consequence to Great Britain, for safety of the navy, for merchant-ships, as well as of improvement of trade, that for want thereof many ships had been retarded in their voyages, and many lost; but if due encouragement were proposed by the public for such as shall discover the same, some persons would offer themselves to prove the same before the most proper judges." The petition was referred to a committee of the House, who called witnesses. Newton appeared before them and gave evidence. He stated that for determining the longitude at sea there had been several projects, true in theory, but difficult to execute. He mentioned four: (1) by a watch to keep time exactly; (2) by the eclipses of Jupiter's satellites; (3) by the place of the moon; (4) by a new method proposed by Mr. Ditton. Newton criticised all the methods, pointing out their weak points, and it is due mainly to his evidence that the committee brought in the report which was accepted by the House, and shortly afterward was converted into a bill, passed both Houses, and received the royal assent. The report ran "that it is the opinion of this committee that a reward be settled by parliament upon such person or persons as shall discover a more certain and practicable method of ascertaining the longitude than any yet in practice; and the said reward be proportioned to the degree of exactness to which the said method shall reach." For the history of the consequences of this report we must refer to the article NAVIGATION.

From an early period of his life Newton had paid great attention to theological studies, and it is well known that he had begun to study the subject of the prophecies before the year 1690. M. Biot, with a view of showing that his theological writings were the productions of his dotage, has fixed their date between 1712 and 1719. That Newton's mind was even then quite clear and powerful is sufficiently proved by his ability to attack the most difficult mathematical problems with success. For it was in 1716 that Leibnitz, in a letter to the Abbé Conti, proposed a problem for solution "for the purpose of feeling the pulse of the English analysts." The problem was to find the orthogonal trajectories of a series of curves represented by a single equation. Newton received this problem about five o'clock in the afternoon as he was returning from the mint, but, though he was fatigued with business, he solved the problem the same evening.

Sir Isaac Newton left behind him in manuscript a work entitled *Observations on the Prophecies of Daniel and the Apocalypse of St. John*, which was published in London in 1733, in one volume 4to; another work, entitled *Lexicon Propheticum*, with a dissertation on the sacred cubit of the Jews, which was printed in 1737; and four letters addressed to Bentley, containing some arguments in proof of a Deity, which were published by Cumberland, a nephew of Bentley, in 1756. Sir Isaac also left a *Church History* complete, a *History of the Creation*, *Paradoxical Questions regarding Athanasius*, and many divinity tracts.

Newton devoted much of his time to the study of chemistry; but the greater number of his experiments still remain in manuscript. His *Tabula Quantitatum et Graduum Caloris* contains a comparative scale of temperature from that of melting ice to that of a small kitchen fire. He wrote also another chemical paper, *De Natura Acidorum*, which has been published by Doctor Horsley. Sir Isaac spent much time in the study of the works of the alchemists.

In the last few years of his life Newton was troubled with incontinence of urine, which was supposed to be due to stone; but with care he kept the disease under control. In January, 1725, he was seized with a violent

cough and inflammation of the lungs, which induced him to reside at Kensington; and in the following month he had a severe attack of gout, which produced a decided improvement in his general health. His duties at the mint were discharged by Mr Conduitt, and he therefore seldom went from home. On February 28, 1727, he went to London to preside at a meeting of the Royal Society; but the fatigue which attended this duty brought on a violent return of his former complaint, and he returned to Kensington on March 4th, when Doctor Mead and Doctor Cheselden pronounced his disease to be stone. He endured the sufferings of this complaint with wonderful patience and meekness, and died on Monday, March 20, 1726-27, in the eighty-fifth year of his age. His body was removed to London, and on Tuesday, March 28th, it lay in state in the Jerusalem Chamber, and was thence conveyed to Westminster Abbey, where it was buried.

NEWTON, JOHN, a prominent Evangelical clergyman of the Church of England, and an intimate friend of the poet Cowper, was born in London July 24, 1725, and died in 1807.

Like his friend, the poet Cowper, Newton held strongly Calvinistic views, although his evangelical fervor allied him closely with the sentiments of Wesley and the Methodists. His enduring fame rests on certain of the *Olney Hymns*, remarkable for vigor, simplicity, and directness of devotional utterance, which have passed into almost universal currency throughout the Reformed churches of English speech.

NEWTON ABBOT AND NEWTON BUSHEL are generally included under the name Newton Abbot, a market-town of Devonshire, England, on the Teign, five miles south by west of Teignmouth, and six north of Torquay. Population, about 10,000.

NEWTON-LE-WILLOWS, or NEWTON-IN-MARKERFIELD, township and urban sanitary district of Lancashire, England, between Liverpool and Manchester. The population of the urban sanitary district in 1871 was 8,244, and in 1881 it was 10,580.

NEWTOWN (Welsh, *Drefnewydd*; ancient name, *Llanfair Cedewain*), a market-town and parliamentary borough of Montgomeryshire, Wales, is situated on both sides of the Severn, eleven miles east-northeast of Llanidloe, and thirteen south-southwest of Welshpool. It is a well-built town with wide and regular streets, although some of the houses are of timber. Population, 8,000.

NEWTOWN, a suburban municipal district of Sydney, New South Wales. It consists chiefly of the residences of the better classes, whose business premises are in the city. It possesses a town hall, a good free library, and a new courthouse. Newtown is connected with Sydney by railway, tramway, and omnibus. The population is 20,000.

NEWTOWNARDS, or NEWTOWNARDES, a market-town, formerly a parliamentary borough, of the County Down, Ireland, nine and one-half miles east of Belfast, and four and one-half south by west of Bangor. Population, 9,000.

NEW YEAR'S DAY. The first day (*calends*) of January, marking the beginning of the year, was observed as a public holiday in Rome from at least the time of the Julian reformation of the calendar. Ovid alludes to the abstinence from litigation and strife, the smoking altars, the white-robed processions to the Capitol; and later writers describe the exchanges of visits, the giving and receiving of presents (*strenæ*), the masquerading, and the feasting with which the day was in their time celebrated throughout the empire. Libanius (c. 346 A.D.) speaks of it as being in his day the one great holiday common to all under the Roman rule.

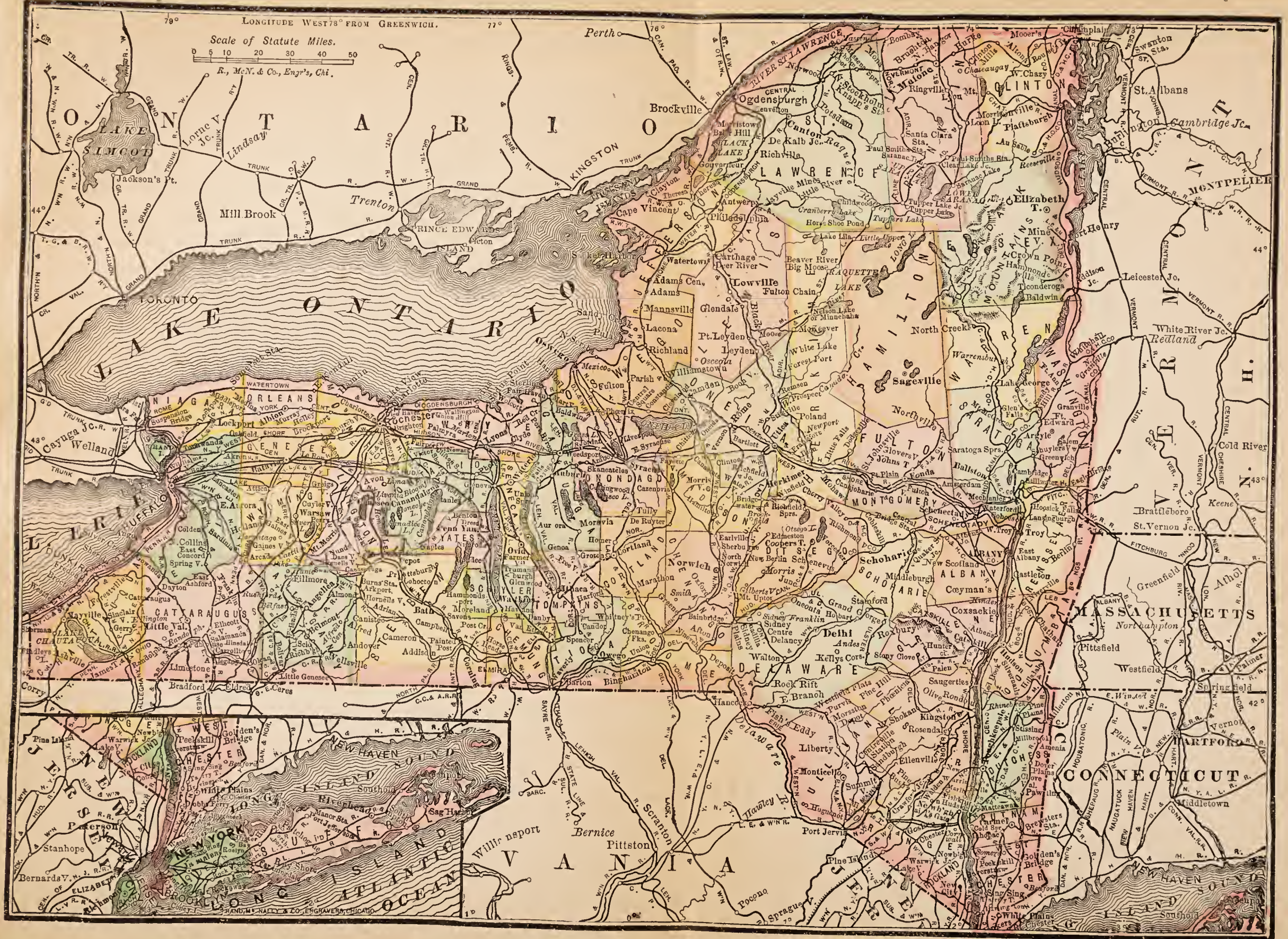
When, about the fifth century, the 25th of December had gradually become a fixed festival commemorative of the Nativity, the 1st of January ultimately also assumed a specially sacred character as the octave of Christmas Day and as the anniversary of the circumcision of our Lord, and as such it still figures in the calendars of the various branches of the Eastern and of the Western Church, though only as a feast of subordinate importance. For particulars as to the date of commencement, and also as to the duration, of the year, whether civil or sacred, in various nations and religions, reference may be made to the article CALENDAR.

NEW YORK, one of the original thirteen United States of America, is bounded north by Lake Ontario and the St. Lawrence river, which separate it from the province of Ontario; east by Vermont, Massachusetts, and Connecticut; south by the Atlantic Ocean, New Jersey, and Pennsylvania; and west by Pennsylvania, Lake Erie, and the Niagara river.

The State of New York has a triangular outline, with a breadth from east to west of 326.46 miles, and from north to south, on the line of the Hudson, of 300 miles. In addition it includes Long Island and Staten Island on the Atlantic coast. Its area is 49,170 square miles—47,620 square miles, or 30,476,800 acres, being land, and the remainder portions of the great lakes that border it. The surface is more diversified than that of any other State in the Union. The eastern and southern portions are high, and from these the land slopes gently north and west to Lake Ontario. The mountainous belt of the eastern part is cut through by the great water-gap of the Mohawk valley, which once connected the Ontario basin with the trough of the Hudson below the present ocean-level, and is the most interesting and important feature in the topography of the State.

The mountains of New York form three distinct groups. (1) The Adirondacks, a series of short ranges having a north-northeast and south-southwest direction, from the center of the elevated region of the northeast section of the State. The highest of these is Mount Marcy, 5,344 feet, with several associated summits which reach the altitude of 5,000 feet. (2) The Catskill Mountains, with their foothills, occupy about 500 square miles south of the Mohawk valley and west of the Hudson; the highest peaks reach an altitude of 4,000 feet. The Helderberg and Shawangunk Mountains are topographically a portion of the Catskills, the first on the north, the second on the south. These all belong to the Alleghany system, and are connected with the mountains of Pennsylvania by the Delaware Mountains, which have an altitude of from 1,600 to 2,800 feet. (3) The Highlands of the Hudson, through which the river passes at West Point, are the northern continuation of the Blue Ridge of Pennsylvania, having an altitude of from 1,200 to 1,800 feet. The so-called mountains of the central and southern counties are portions of a high plateau which connects with the Helderberg and Catskill Mountains on the east. This is cut by eroded valleys in such a way as to leave many elevated points, of which the highest is East Hill in Otsego county, 2,300 feet above the sea. One of the most peculiar and impressive topographical features is formed by the cliffs of the Palisades, which border the Hudson in Rockland county, and are continuous with those of New Jersey.

Two of the chain of great lakes border the State, Lake Erie and Lake Ontario, connected by the Niagara river, on which is the most celebrated cataract in the world. Lake Erie gives about seventy-five miles of coast-line to New York, Lake Ontario over 200. The surface-level of the former is 573 feet above the sea, of the latter 245 feet; and this is 606 feet deep. A portion of the eastern



border of New York is formed by Lake Champlain, which lies in the trough between the Adirondacks and the Green Mountains. Within the State the number of lakes is very great. The largest is Lake George, famous for its beautiful scenery. Through the central portion a series of peculiar elongated lakes are found which lie with a nearly north-and-south bearing on the slope from the southern highlands to the Ontario basin, or the Mohawk valley. The largest of these are Cayuga, Seneca, Oneida, Crooked, Canandaigua, Owasco, and Otsego. The Adirondack region is famous for its system of lakes, which are favorite places of resort for tourists. Among the rivers of New York the Hudson is the largest and most beautiful. Formerly it ran several hundred feet below its present level, and was the great channel of drainage which led through the Mohawk valley from the interior. Now, by a subsidence of the continent, it is an arm of the sea, and navigable to Troy, 151 miles from its mouth. The Black River, the Mohawk, and the Genesee are all large streams which lie entirely within the State, while the Alleghany, the Susquehanna, and the Delaware rise there, but soon leave it to become the great rivers of Pennsylvania. From the varied topography and the abundant rainfall the number of streams is large, and many of them are marked by picturesque falls. Besides the great cataract of Niagara, a mile wide and 164 feet high, which New York shares with Canada, there are many other falls worthy of mention, as those of the Genesee at Rochester and Portage, Trenton Falls, the Falls of Ticonderoga, etc. Among the natural features which distinguish the State its mineral springs deserve special mention. Those of Saratoga, Ballston, Sharon, Avon, and Richfield are famous throughout the Union. They differ much in chemical composition and medicinal virtues, but all are popular places of resort, and some have gathered round them towns of considerable size.

In a general way it may be said that the climate of New York is typical of that of the northern United States, a climate of extremes, hot in summer and cold in winter, and yet healthful, stimulating, and on the whole not disagreeable. The average annual temperature is about 47° Fahr., the average maximum of summer heat 93°, the temperature of 100° being rarely reached, and 102° the highest maximum record. The minimum temperature is about -20° Fahr., never attained in the southern portion, seldom in the central, but often passed by four or five degrees in the most northern counties. The average rainfall is about forty inches. Frosts begin from September 1st to October 1st, and end from April 1st to May 1st, according to the locality and year. In the Adirondack region the snowfall is heavy, the winter long and severe. In central New York it is not uncommon for snow to accumulate to the depth of three or four feet, and yet this is not persistent. About New York city and on Long Island the snow rarely exceeds a foot in depth, sleighing is always uncertain, and sometimes the ground will be bare for weeks together.

In the absence of extensive alluvial plains and marshes, there is little malaria, and the climate is salubrious. About New York city and on Long Island the ocean softens the rigors of winter, and through the influence of the Arctic current, which bathes the coast as far south as Cape Hatteras, renders the summer perceptibly cooler. At the advent of the whites the fauna of New York included all the wild animals which were found in the northeastern States of the Union or the adjacent portions of Canada, but by the cutting off of forests, and the occupation of the surface by farms, the range of the native animals has been greatly reduced, and they have been unceasingly destroyed by man.

Formerly the elk, the moose, and the caribou were abundant in the northern part of the State, but they are now all exterminated, while the Virginia deer in many localities is still plentiful. Of the carnivorous animals, the cougar, the black bear, two species of lynx, the red and gray foxes, the wolf, otter, fisher, pine marten, mink, and skunk still remain, but the wolf is on the eve of extermination, and the wolverine, never abundant, have migrated northward. Among the rodents the beaver and variable hare are found, but in small numbers, while rabbits, squirrels, rats, mice, fieldmice, etc., are still unpleasantly numerous.

Civilization has made but little difference with the reptiles birds, and fishes. All the birds indigenous to the eastern portion of the continent may at times be found within the State, though their native numbers are affected by the removal of the forests. Among the reptiles are seventeen species of snakes, three of which, two rattlesnakes and one copperhead, are venomous. The fishes include all the species found in the lower lakes, in the rivers of the temperate portions of the continent, and on the Atlantic coast; and the fisheries constitute an important element in the revenues and subsistence of the people. The oyster industry of the coast has its chief commercial center in New York city, and an important fraction of the supply of clams, oysters, lobsters, and sea fish is obtained from the New York coast.

Originally the surface of New York was occupied by an almost unbroken forest, and, as a consequence of a general fertility of the soil, its topographical diversity, and the range of latitude and longitude, the flora is rich and varied. About seventy species of trees are known to inhabit the State, and these include all found in the adjacent portions of the Union and Canada. The most abundant are oaks, of which there are fifteen species, five species each of maple, pine, and poplar, four species of hickory, three each of elm, spruce, and ash, two of willow, cherry, magnolia, and pepperidge, and one each of larch, liriodendron, dogwood, arbor vitæ, balsam, yew, sycamore, honey locust, sweet gum, locust, butternut, black walnut, chestnut, beech, hornbeam, basswood, sassafras, and mulberry. On the summits of the Adirondacks a true alpine vegetation is found, though consisting of but a small number of plants.

The mineral resources of New York, though less varied than those of some other States, are still of great importance. The most valuable of these are extensive deposits of iron ore, viz.: (1) magnetite, found in great abundance in the Adirondack region, and in Putnam, Orange, and Rockland counties; (2) hematite, mined in the vicinity of Rossie (St. Lawrence county), Clinton (Oneida county), and elsewhere; (3) limonite, largely worked on Staten Island, and at Amenia, Sharon, etc., on the line of the New York and Harlem Railroad; (4) siderite, mined at Hyde Park on the Hudson. New York is surpassed in the quantity of iron produced by Michigan and Pennsylvania only.

The quarries of New York are numerous, and they furnish a great variety of products: granite in the Adirondacks and along the Hudson; roofing-slate in Washington county; white marble in Westchester and St. Lawrence counties; red marble at Warwick, Orange county; black marble at Glens Falls; verde antique at Moriah and Thurman. Sandstone comes from Potsdam, Medina, and various other localities; shell-limestone from Lockport and Hudson; excellent flagging from Kingston on the Hudson; and paving-stone from the trap of the Palisades. A large amount of hydraulic cement is supplied from the quarries at Rondout (Ulster county), Manlius (Onondaga county), and Akron, near Buffalo; also gypsum from the vicinity of Syracuse

The deposits of these substances are very extensive, and their production could be increased indefinitely. Another item of importance among the mineral resources of the State is the salt produced from the salt-wells at Syracuse; these have been worked for many years. In southwestern New York gas and oil springs are numerous, and at Fredonia the gas has been used in lighting houses for half a century. Recent discoveries show that the petroleum fields of Pennsylvania extend into New York, and it is probable that petroleum will soon claim a place among the mineral products of the State.

The first European discoverers and explorers found the eastern slope of the continent under the domination of the Iroquois tribes. John Smith met with them on the north waters of Chesapeake Bay in 1607, and Hudson found them in 1609 on the banks of the river to which he gave his name. The chief seat of this powerful nation, whose sway was recognized from the St. Lawrence to the Tennessee and from the Atlantic to the Mississippi, was in the wide and fertile region of western and northern New York. They organized the political league or confederacy known as the Five Nations. These were the tribes of Mohawks, Onondagas, Cayugas, Senecas, and Oneidas. They took the name of "Konoshioni," or People of the Long House, by which they designated the territory occupied by them, extending west from the Hudson at Albany to the foot of the great lakes, a distance of about 325 miles. There is a tradition in one of the tribes that the confederation was formed four years before Hudson's arrival, which would fix the date at 1605. In 1609 Champlain, while accompanying a war party of Hurons and Algonquins on an expedition against the Iroquois, fell in with the enemy on the lake to which he gave his name. European firearms, with which the Iroquois then made first acquaintance, turned the scale of victory against them. The interference of the French aroused in the formidable confederacy a spirit of enmity which, relentlessly nourished, finally arrested the progress of French colonization and French power in Canada, and later secured the triumph of the English arms. The confederacy was at the height of its power about the year 1700. In 1715 they were joined by the Tuscaroras, driven out from North Carolina, and were afterward known as the Six Nations. Until the conquest of Canada by the English in 1763 they were in constant struggle with their French neighbors. The American Revolution proved fatal to them. In 1779 their towns were burned, their orchards and stores of grain destroyed. At this time their civilization was at its height, their houses were of frame, some of elegant construction, their gardens, orchards, and farm-lands extensive and abundantly supplied with fruit. From this terrible calamity they never recovered. Their numbers have been estimated as 25,000 in 1650, and in 1750 about half that number, of whom about 2,500 were fighting-men. Disregarded in the treaty of 1783, their political existence terminated, and their lands were ceded to the State with some small reservations. The last official State census reports the total number of Indians in the State at 5,117, chiefly the remains of the Iroquois tribes. Of these 4,707 were living on reservations.

At what time, and by whom, the Bay of New York was first visited by European voyagers is still in doubt. Verrazano is claimed to have entered it with the *Dauphine* in 1524, and Gomez to have sailed along the coast to the latitude of New York in 1525. Of the voyage of Henry Hudson (see HUDSON) there is no doubt. Hudson's report of the picturesque grandeur of the fine harbor and river, of the fertile country on its shores, of the kindly disposition of the Indians, and of the abundance of fur-bearing animals in the interior caused great ex-

citement in Holland; and the United Netherlands, whose independence had been acknowledged in the spring, asserted their claim to the newly discovered country. On the expiration of the charter of the United Netherland Company (October, 1618) a renewal was refused by the states-general, but private ventures were authorized. The exploration of the coast and rivers was actively continued, but special charters to the discoverers were persistently refused. On June 3, 1621, the states-general granted to the West India Company a charter with full powers over New Netherland for a period of twenty-four years. The territory was formally erected into a province, and the management of its affairs assigned to the chamber of Amsterdam. In the year 1622 they sent out trading-vessels and took formal possession of the country. Manhattan Island was purchased of the Indians for the West India Company, and a fort was built which was named Fort Amsterdam. The little colony was annoyed by the encroachments of the English of the New Plymouth colony, and disturbed by the hostilities between the Indian tribes in their immediate neighborhood. The Swedes now began aggressions on the southern border of the Dutch province. In 1664 the colony fell an easy conquest to the English. The population of the province was now fully 10,000, that of New Amsterdam 1,500 persons.

The English government was hostile to any other occupation of the New World than its own. In 1621 James I. claimed sovereignty over New Netherland by right of "occupancy." In 1632 Charles I. reasserted the English title of "first discovery, occupation, and possession." In 1654 Cromwell ordered an expedition for its conquest, and the New England colonies had engaged their support. The treaty with Holland arrested these operations, and recognized the title of the Dutch. In 1664 Charles II. resolved upon a conquest of New Netherland. A patent was issued to the duke of York granting to him all the lands and rivers from the west side of the Connecticut river to the east side of Delaware Bay. The duke's authority was proclaimed, and New Netherland became New York. The name of Fort Orange was changed to Fort Albany, after the second title of the duke. Religious liberty was as large as in England. In 1673 (August 7), war being declared between England and Holland, a Dutch squadron surprised New York, captured the city, and restored the Dutch authority and the names of New Netherland and New Amsterdam. But in July, 1674, a treaty of peace restored New York to English rule. By the accession of the duke of York to the English throne in 1685 the duchy of New York became a royal province. The charters of the New England colonies were revoked, and together with New York and New Jersey they were consolidated into the dominion of New England. Dongan was recalled, Sir Edmund Andros, who suggested the policy, was commissioned governor-general. He assumed his viceregal authority at New York, August 11, 1688. The English Revolution of 1688 had its faint counterpart in the colonies in an insurrection of the militia, headed by one Jacob Leisler, which was not terminated till the arrival from England in 1691 of a new governor, Sloughter, with whose administration what may be called the second period of English rule begins.

The assembly which James had abolished in 1686 was established, and in May declared the rights and privileges of the people, reaffirming the principles of the repealed charter of liberties of October 30, 1683; but religious liberty was curtailed and the Test Act put in force as to Roman Catholics. The government was to be ruled as a province by a governor and council—the

governor having power to institute courts, appoint judges, disburse the revenues, veto all laws, and prorogue or dissolve the assembly at pleasure. The provincial legal authorities protested at once against this access of prerogative. Thenceforth the political history of the province records one continued struggle between the royal governors and the general assembly—the assembly withholding money grants, and the governors exercising the power to dissolve it at will. The chief concern of the province was the defense of the northern frontier. The quartering of British troops became a constant irritation between the people and the officers, and the need of money by the authorities caused as severe a struggle between the governors and the assembly. The conquest of Canada in 1763 closed the long contest in which New York troops were constantly engaged. A general congress of the colonies held in New York in 1765 protested against the Stamp Act and other oppressive ordinances, and they were in part repealed.

On the breaking out of hostilities, New York immediately joined the patriot cause; the English authority was overthrown, and the government passed to a Provincial Congress. In May, 1775, Forts Ticonderoga and Crown Point, which commanded Lakes Champlain and George, and secured the northern frontier, were captured by the Americans. New York city became the headquarters of the continental army under command of General Washington. On July 9, 1776, the Provincial Congress reassembled at White Plains, and formally took the name of the representatives of the State of New York. The same day they proclaimed their adhesion to the Declaration of Independence. The defeat of the Americans on Long Island, August 27, 1776, was followed by the abandonment of the city, September 15th, the army of Washington retiring to the high ground at the northern end of the island. Next day a conflict took place between the advanced troops where Manhattanville now stands. The movement of Howe to White Plains, and his subsequent successful operations, compelled the withdrawal of the Americans to New Jersey. In 1777 the advance of Burgoyne from Canada was checked at Saratoga and his entire army captured; a diversion attempted by St. Leger by way of the Mohawk was likewise unsuccessful. An attempt of Clinton to aid Burgoyne, in which he captured the forts at the entrance to the Hudson Highlands, failed; West Point continued to command the passage of this important line of communication. On April 20, 1777, the State assembly adopted the first constitution. Gen. George Clinton was elected governor, and held the office till the close of the war. In 1779 (July 16th) Stony Point was captured by the Americans. In 1780 the failure of Arnold's treason put an end to the schemes of the British to command the river. The only other action of importance on the soil of the State was the punishment of the Indians who had aided Sir John Johnson in his incursions. Sullivan with 3,000 men penetrated to the heart of the Seneca country and destroyed the towns. In the summer of 1781 Rochambeau with French troops made a junction with Washington in Westchester county, and New York city was threatened by the allied forces. News of the approach of the fleet of De Grasse to Chesapeake Bay caused a transfer to Virginia of the military operations. On the conclusion of the war New York was evacuated, November 25, 1783. Freed from armed occupation, and its seaport regained, the State made rapid progress. Its natural advantages, which the war disclosed, attracted settlers from other States, and the western lands were quickly taken up. In 1788 (July 26th) New York adopted the Federal constitution, became the most important member of the National Union, and received

popularly the name of the Empire State. The seat of government was transferred from New York city to Albany in 1797. The progress of the State met with no interruption until the war with Great Britain in 1812, when its northern frontier became the seat of operations by land and water. The treaty of Ghent put an end to the war, and important schemes for the development of the internal navigation to bring the products of the State to tidal water were rapidly consummated. Steamboat navigation began on the Hudson in 1807, and the canal system was perfected in 1825 in the completion of the Erie Canal, which opened the country from the lakes to the sea. This important artery of commerce has been recently freed from toll by popular vote. The railroad system is still more perfect; great lines traverse the State from its eastern to its western extremity, and a network of minor lines connects every town and village of any importance in the State with the central arteries.

At the close of the Dutch period the settlement of that part of New Netherland which afterward became New York was confined to Manhattan, Long, and Staten Islands, and the banks of the Hudson. Westward of these there were small trading stations on the line of the Mohawk and other water carriages. Early in the last century the admirable natural channel of communication which by the Mohawk river and Wood Creek connects the Hudson with the great lakes attracted immigration. The fertile valley of the Mohawk was the first occupied. After the war settlements spread with rapidity. The State of New York ceding to Massachusetts about 10,000 square miles of territory, there was, before 1800, a large immigration from New England, which extended itself over the interior of the State to its western boundary. This was essentially an agricultural population. The military lands set apart as bounties during the war, to the amount of 180,000 acres, were rapidly taken up by the immigrants who flowed into the western country like a torrent, opening roads and founding villages and towns. Between 1784 and 1800 two cities, three large villages, and numerous smaller settlements were founded, and the population of the State doubled in numbers. The foreign immigration of the last forty years has chiefly settled on the lines of the great railroads, which present an almost unbroken chain of industrial cities.

The fundamental constitution of the State, adopted in 1777, was in its main features after the English model—a chief executive and two separate legislative chambers; justice administered through local county courts, a probate judiciary, a high common-law tribunal called the supreme court, side by side with a court of chancery; final appellate jurisdiction in law and equity vested in the State senate. Religious liberty to all was absolutely secured. In 1821 a new convention greatly simplified the machinery of administration. Under this new constitution the people took to themselves a large part of the powers before delegated to the assembly. The elective franchise was extended by a removal of freehold qualification. In 1846 a new constitution made radical changes in the framework of government. The elective franchise was further extended by diminution of residence qualification; elective districts were established on the basis of population, and shifted with the varying censuses. The elective principle, before confined to part of the executive and legislative officers, was applied also to the judiciary. The separation of the legal and political departments of government was complete. The question was again submitted to the people in 1873, and the election of the judiciary maintained by a large majority. Some slight amendments have been since made. The constitution, as finally matured, completely carries out the principle of a

government of the people by its own directly chosen agencies. Elective restrictions upon negroes and mulattoes were removed by degrees. Slavery was gradually abolished under an act passed in 1799. In 1811 the only discrimination was the requirement of a certificate of freedom. The constitution of 1821 imposed both a residence and a freehold qualification, restrictions which remained until removed in 1870 by the fifteenth amendment to the Federal constitution, when suffrage to males became absolutely free in the State. Married women were secured in their separate rights to real and personal property by statute in 1848. Imprisonment of witnesses was put an end to by act of 1882.

The grant of the West India Company (1629) to the planters of New Netherland required the establishment of a school, and, in 1644, the burgomasters of New Amsterdam made a municipal provision for school purposes in the colony; but this proved nominal, and instruction received little attention until after the arrival of Stuyvesant, when an academy and classical school was established (1659). At the conquest, in 1664, the English found this institution in high repute, and in addition three public schools and a number of private Dutch schools in the city alone. The academy or Latin school was continued by the English authorities for a few years, but the Dutch schools received no government contribution. In 1702 a free grammar school was established by act of Assembly. In 1710 a school was founded by Trinity church, and similar provisions by other religious denominations followed. In 1754 King's College (reorganized in 1784 as Columbia) was established by charter. Here many of the men who became distinguished in the annals of the State received their education. Its departments were fully organized when the Revolution put an end to all instruction, and the building became a military hospital. The Legislature of the State, in 1795, granted an appropriation of \$50,000 for five years for common-school purposes. A general school system was organized by commissioners in 1812. District libraries were instituted in 1838, and a State normal school established in 1844. In 1849 a free-school law was enacted, but its unequal operation caused its repeal. In 1867 a free-school law was again enacted. The schools of the State are noted for their efficiency. All the common schools are free, and are supported by the income of a school fund, and by a State, city, and district tax. A superintendent of public instruction has general supervision. School commissioners elected by the people have charge in each district, and there are boards of education in all the cities. The expenses for the fiscal year ending August 20, 1887, were \$14,461,774. The total valuation of school property was \$36,376,553, and 31,318 teachers were employed. The number of persons of school age (five to twenty-one years) was 1,763,115; the enrollment in the schools was 1,037,812, and the average daily attendance 625,610. For the year ending August 30, 1888, the total expenditure for education was \$15,686,012.

The public charities were by act of 1867 placed under the charge of a board of State commissioners of public charities, who are paid expenses but receive no salary. The institutions wholly or chiefly maintained by the State are—asylums for the insane, inebriate, deaf and dumb, blind and idiots, and establishments for reform of juvenile delinquents. In the counties, cities, and towns there are public poorhouses and asylums, besides hospitals, dispensaries, and homes in great variety.

Wealth and Taxation.—The aggregate assessed valuation of the wealth of the State was in 1888 \$3,469,199,945, of which amount \$3,122,588,084 was real and \$346,611,861 personal.

Finances.—The fiscal affairs of the State have been managed on correct principles, and its credit has been maintained unimpaired. To this its payment of the interest and principal of its bonds in coin during the temporary suspensions of specie payment which preceded the civil war and the long national suspension which followed its outbreak greatly contributed. The total funded debt of the State September 30, 1888, was \$6,965,354.87, over \$6,000,000 of which represents the canal debt. The receipts of the State treasury during the fiscal year ending at same period were \$17,800,755, and the payments \$17,626,557.

New York State is one of the most important of the Union with regard to agriculture. The United States Department of Agriculture gave the crops for 1887 as follows:—

PRODUCTS.		Acres.	Value.
Indian corn.....bushels	23,410,000	709,406	\$13,343,700
Wheat....."	10,137,000	666,883	8,312,340
Rye....."	2,533,000	234,506	1,545,130
Oats....."	33,208,000	1,413,088	12,286,960
Barley....."	6,733,000	340,028	4,578,440
Buckwheat....."	4,130,000	317,663	2,188,900
Potatoes....."	23,327,000	353,433	14,462,710
Tobacco.....pounds	7,623,000	5,775	876,645
Hay.....tons	5,818,900	5,059,913	62,611,364
Total.....	.....	9,100,695	\$120,206,219

On January 1, 1889, there were in the State 680,758 horses, 1,552,373 milch cows, 842,617 other cattle, 1,548,426 sheep, and 679,526 hogs. The milk, butter, and cheese product of New York is of great value.

On October 1, 1888, there were 130 banks of deposit and discount in active operation; an increase of twenty-five banks and \$2,235,000 capital in one year. The aggregate resources of the State banks on September 22d were \$217,398,717; an increase over 1887 of \$26,440,170. As evidence of the prosperous condition of the State banks, it is noted that there has been no reduction in the capital of any of the number during the year, and not a single suspension or failure has occurred in that period. The total amount of interest-bearing deposits was \$165,317,364.07; an increase of \$18,685,900.50. Three new trust companies with a capital of \$1,500,000 were organized during the year. The total capital employed by the trust companies operating under the State laws shows an increase of \$3,498,000 in the same period. At the close of the fiscal year there were seventeen safe-deposit companies in operation, with an aggregate capital of \$3,123,900.

New York is the first manufacturing State in the Union, and in the last decade the value produced has increased nearly 35 per cent. In 1880, there were in the State 42,739 establishments, employing a capital of \$514,246,575 and 531,533 hands. The amount paid in wages was \$198,634,029; for materials, \$679,612,545. The products were valued at \$1,080,696,596.

The vessels of all classes built in the State during the fiscal year ending June 30, 1882, numbered 1,371, aggregating 282,269 tons. Of these there were 668 sailing-vessels of 118,798 tons, 502 steamers of 121,942 tons, 68 canal-boats, and 135 barges.

The chief fishing industry is the taking of menhaden, in value (1880) \$1,114,158, and the raising of oysters, value in 1880 \$1,577,050; other fisheries, \$1,689,357. The total number of hands employed in all branches was 7,266, the amount of capital \$2,629,585, and of product, \$4,380,565; the number of vessels employed was 541, measuring 11,583 tons, valued at \$777,600.

New York, owing to its magnificent seaport and its

admirable land and water communication, enjoys a large proportion of the national trade.

On January 1, 1889, there were in the State 7,437 miles of railroad, with gross earnings of \$152,122,705 and net earnings of \$50,517,643. In 1888 there were 4,942,948 tons of freight carried over the Erie canal. The aggregate assets of fire and marine insurance companies doing business within the State in 1888 was \$163,041,841.

New York has the largest population of any of the United States. The census of 1880 gave it 4,382,759, and that of 1890 showed that it had increased to 5,997,853. New York city is the largest, Brooklyn next, and there are thirty large cities in the State, all of which are treated under their respective titles.

NEW YORK, the most important and populous city of the Western Hemisphere, is situated on New York bay, at the junction of the Hudson or North river with a strait known as the East river, leading to Long Island sound. Latitude of city hall, $40^{\circ} 42' 43''$ N.; longitude, $74^{\circ} 0' 03''$ W. of Greenwich. Distance, in straight line from the Atlantic ocean, 18 miles; from Chicago, 715 miles; from Washington, 205 miles; from Boston, 190 miles; from Albany, 145 miles. The territory of the city comprises the whole of Manhattan island, or New York county; so much of Westchester county as lies between the city of Yonkers, the Bronx river, the East river, the Harlem river, Spuytenduyvil creek, and the North river; Blackwell's, Ward's, and Randall's islands in the East river, and Governor's, Ellis', and Bedloe's islands in New York bay. The portion of the city lying in Westchester county is known as the "Annexed District," and is but sparsely settled. The islands in the East river are occupied by various public charitable and correctional institutions, and those in the bay are under control of the United States Government, their connection with New York being political only. The total area of the city is $41\frac{1}{2}$ square miles; its length, from north to south, 16 miles, and its greatest width $4\frac{1}{2}$ miles. The area of Manhattan Island is 22 square miles, or about 14,000 acres; its length $13\frac{1}{2}$ miles, and its greatest width, at 14th street, $2\frac{1}{4}$ miles. Below the city extends the magnificent bay, forming an irregular oval about 8 by 5 miles. From this a strait, known as "The Narrows," separating Long Island from Staten Island, gives access to the lower bay, from which, in turn, several channels lead past Sandy Hook and Coney island to the open sea. The harbor is accessible at low tide by ships drawing thirty-two feet of water.

The older portion of the city on Manhattan island, below Houston street on the east side, and 14th street on the west, is somewhat irregularly laid out; but the more modern portion as far north as the Annexed District, is arranged upon a plan whose foundation is a system of streets, designated by numbers, extending from the North river to the East river, and crossed at right angles by numbered and lettered avenues. The streets are divided into "east" and "west" by Fifth avenue, and the house numbers begin a new hundred at the corner of each numbered or lettered avenue; thus, No. 200 West Twenty-sixth street will be found on the corner of Seventh avenue, No. 300 East 19th street on the corner of Second avenue, and so on. There are a few exceptions to this system. These are: Broadway (styled the Boulevard above the lower end of Central Park), Madison avenue, extending northward from East 23d street; Lexington avenue, extending northward from East 21st street; St. Nicholas avenue, with its extension, the Kings Bridge road; and a few other streets in the northern part of the city.

The peculiar topography of New York—the most im-

portant portion of the city being located on a long and narrow island, restricting the spread of settlement, within the city limits, to a single direction—has resulted in an extraordinary density of population (in one part of the city nearly 200,000 to the square mile), and has also favored the development of an immense system of neighboring cities and suburbs, whose inhabitants visit New York daily for the transaction of their business. The commercial center of the town, originally at the lower end of Manhattan island, moves steadily northward year by year as trade increases, pushing the residence district before it. The problem of rapid transit between the northern and southern portions of the city is thus one of pressing and overwhelming importance. It has been solved, for the present, by the construction of the elevated roads. Short distance travel about the city is accommodated by numerous surface railways, operated by horses, cables, and electricity. The uniform rate of fare is 5 cents.

With the sister city of Brooklyn, New York is connected by an extensive system of ferries, and by the East River, or Brooklyn Bridge. Ferries are maintained from Catharine street, New York, to Main street, Brooklyn; Fulton street, New York, to Fulton street, Brooklyn; Whitehall street to Atlantic street; Whitehall street to Hamilton avenue; Wall street to Montague street; Whitehall street to 39th street; Roosevelt street to Broadway; Houston street to Grand street; Grand street to Broadway; Grand street to Grand street; and East 23rd street to Broadway. Ferries to the suburbs of Brooklyn are run as follows: East 10th street and East 23rd street to Greenpoint; James Slip and East 34th street to Hunter's Point; and East 92d street to Astoria. Most of these ferries are run at frequent intervals throughout the twenty-four hours; the boats are well equipped and capacious. The ferry franchises are the property of the city of New York, and are rented to the corporations operating the ferries by public auction at stated periods.

The Brooklyn or East river suspension bridge is one of the engineering triumphs of the age. Starting from a point on Chatham street, opposite the city hall park, New York, it extends to the square bounded by Fulton, Prospect, Sands, and Washington streets, Brooklyn, a total length of 5,989 feet. The bridge consists of a central span, from shore to shore, of $1,595\frac{1}{2}$ feet; shore spans, from the towers to the cable anchorages, each, 930 feet long; a viaduct approach of masonry on the New York side, $1,562\frac{1}{2}$ feet; and a similar approach on the Brooklyn side, 971 feet. The suspension bridge proper is supported by two granite towers, over which the cables are passed and secured to heavy anchorage plates, set in solid masonry. The towers rest on caissons, sunk to bed-rock below the river, and solidly filled with concrete. The bridge is eighty-five feet wide, including a roadway on each side for vehicles, a central promenade, thirteen feet wide, for foot passengers, and two railway tracks, on which trains are run at intervals of a few minutes, the traction power being furnished by a stationary engine at the Brooklyn terminus, through an endless cable. The yearly travel amounts to over 3,000,000 foot passengers; nearly 40,000,000 railway passengers, and an immense number of vehicles. The toll for foot passengers is 1 cent; railway fare, 3 cents; but tickets are sold in packages at the rate of $2\frac{1}{2}$ cents by rail; and $\frac{1}{5}$ of a cent for pedestrians. The construction of the bridge was begun January 2, 1870, and the structure was opened for travel May 24, 1883. The cost of building exceeded \$15,000,000. The bridge is the joint property of the cities of New York and Brooklyn. Height of main span above high-water mark, $135\frac{1}{2}$ feet; height of towers above high-water mark, $271\frac{1}{2}$

feet; depth of tower foundations below high-water mark, New York side, 78½ feet; Brooklyn side, 44½ feet; number of cables, 4; diameter of each cable, 15¾ inches; length of each cable, 3,578½ feet; number of wires in each cable, 5,434; weight of wire, about 1 pound to 11 feet; weight of 4 cables, 3,588½ tons; sustaining strength of each cable, 12,200 tons; estimated strain on each cable when bridge is used to fullest capacity, 3,000 tons; weight of entire suspended structure, 6,740 tons; height of roadway at towers, 119 feet; height of arches above roadway, 117 feet; height of towers above roadway, 159 feet; size of towers at top, 53 x 136 feet; width of openings through towers, 33 feet 9 inches; cubic yards of masonry in towers—New York, 46,945; Brooklyn, 38,214. A special police force patrols the bridge at all hours for the purpose of preserving order, stopping runaways, etc. The executive *personnel* consists of six chiefs, thirty-one collectors, seventeen gatemen, ninety conductors, and ninety-one policemen, all under control of the board of trustees.

With the sub-metropolitan cities on the New Jersey side of North river, New York is connected by ferries operated by the various lines of railway terminating on the New Jersey shore. These are: from Desbrosses street and from Cortlandt street to the Pennsylvania Railway depot in Jersey City; from Liberty street to the New Jersey Central Railway depot in Communipaw; from Chambers street and from West 23d street to the Erie Railway depot in Jersey City; from Barclay street and from Christopher street to the Delaware, Lackawanna and Western Railway depot in Hoboken; from Jay street and from West 42d street to the West Shore Railway depot at Weehawken; and from West 14th street to 14th street, Hoboken. Other ferries connect the city with Fort Lee, Staten Island, and the islands in the bay and East river. A tunnel beneath the North river is in process of construction, but will not be finished for some years to come.

Geographically New York occupies a situation of unequaled advantage for commercial development. The harbor is one of the most spacious in the world, the bay containing fourteen square miles of anchorage, and the rivers bordering on the city thirteen and a half miles more. On Manhattan Island alone the deep water frontage available for shipping extends twenty-five miles, and the frontage on Long Island, Staten Island, and the New Jersey shore is practically unlimited. The Hudson river and Erie canal form a direct water route to the great lakes; a vast system of railways and coast-wise steamship lines connects the city with all other parts of the continent; numerous lines of steam packets afford frequent and regular intercourse with foreign ports, and a network of telegraph lines and ocean cables gives instantaneous communication with all the other commercial centers of the world. As a result of these advantages New York has become the commercial metropolis of half the world. About 60 per cent. of the entire foreign commerce of the United States passes through her port.

Number and tonnage of vessels belonging to the port of New York, June 30, 1889:

CLASS OF VESSELS.	Number.	Tonnage.
Sailing vessels.. .. .	2,167	422,664.37
Steam vessels.. .. .	1,076	372,896.37
Canal boats.. .. .	208	21,298.34
Barges.. .. .	631	129,455.27
Totals.. .. .	4,082	946,314.35
Total United States.. .. .	23,623	4,307,475.24

Monthly receipts from customs at New York for three years :

MONTHS.	1887.	1888.	1889.
January.....	\$11,792,309.48	\$13,499,155.07	\$14,031,750.21
February.....	13,096,217.48	13,138,231.29	12,954,910.52
March.....	14,200,807.33	11,054,638.21	13,423,093.84
April.....	11,547,111.54	11,159,083.32	11,963,737.03
May.....	10,887,700.40	9,982,059.71	11,097,652.64
June.....	11,827,248.85	10,988,946.36	10,697,750.42
July.....	12,705,045.43	14,159,594.45	13,787,329.06
August.....	15,602,081.70	13,854,742.26	13,324,501.67
September.....	13,825,677.34	12,124,963.96	12,016,108.12
October.....	12,380,656.47	11,969,848.69	12,202,036.15
November.....	10,178,869.86	9,609,828.40	11,176,009.20
December.....	9,777,050.66	10,962,999.20	10,097,985.55
Total.....	\$147,820,776.54	\$142,504,090.92	\$147,672,865.31

Imports of leading articles into the port of New York, for fiscal year ending June 30, 1889, as compared with all other ports in the United States for same period :

ARTICLES.	Value.	Port of New York.	All Other Ports.	Totals.
Sugar, lbs. 1,463,051,343	\$42,943,453			
Molasses, gals. 8,498,875	1,424,251	\$44,367,704	\$48,930,164	\$93,297,868
Coffee, lbs. 455,979,016		58,860,319	15,864,563	74,724,882
Tea lbs. 58,476,531		9,643,514	3,011,126	12,654,640
Manufactures of wool,		41,048,679	11,516,263	52,564,942
Manufactures of silk,		31,129,113	3,993,653	35,122,766
Manufactures of cotton,		20,599,285	6,206,657	26,805,942
Manufactures of flax,		18,457,806	7,247,747	25,705,553
Hides and skins, other than furs,		17,562,461	7,565,289	25,127,750
Tin (bars, blocks and pigs,) lbs. 30,662,815	6,351,993			
Tin plates, lbs. 296,616,337	8,473,505	14,825,588	13,411,560	28,237,148
India rubber & gutta percha, crude, lbs. 28,952,361		11,094,063	1,293,068	12,387,131
Leather, all kinds 3,542,859				
Manufactures of leather, 4,654,840		8,197,699	3,098,623	11,296,322
Tobacco, leaf, lbs. 14,766,244	8,297,085			
Manufactured 1,850,798		10,147,883	4,463,107	14,610,990
Precious stones 9,498,209			1,273,424	10,771,633
Raw silk, lbs. 1,984,797		7,408,647	11,135,378	18,544,025
Wool, lbs. 53,520,892		6,540,930	11,433,585	17,974,515
Wines, 6,156,821			1,549,951	7,706,772
Hemp, tons, 37,755	6,394,451			
Sisal grass, etc., tons, 29,181	4,437,105			
Jute, tons, 82,327	2,599,659	13,431,215	4,966,531	18,397,746
Furs, dressed on skins, and manufactured 4,748,971			579,085	5,328,056
Earthen, stone and china ware 3,236,780			3,245,519	6,476,299
Total value of leading articles of foreign merchandise	\$336,949,687	\$160,785,293		\$497,734,980
Total value of all other articles of foreign merchandise	135,203,820	112,192,852		247,396,672
Total value of coin and bullion	7,274,618	21,688,455		28,963,073
Total foreign imports, 1888-89	\$479,428,125	\$294,666,600		\$774,094,725

Exports of leading articles of domestic merchandise from the port of New York for fiscal year ending June 30, 1889, as compared with all other ports in the United States for same period:

ARTICLES.	Port of New York.	All Other Ports.	Totals.
Cotton, bales, 1,118,981; lbs. 536,614,048	\$54,701,315	\$183,073,955	\$237,775,270
BREADSTUFFS. Value.			
Wheat, bush. 9,086,407	\$8,449,510		
Flour, bbls. 3,335,195	15,498,193		
Corn, bush. 26,658,970	13,066,961		
All other breadstuffs 1,765,287			
	38,779,951	85,096,710	123,876,661
PROVISIONS.			
Beef, canned, lbs. 22,515,849	\$1,826,998		
Beef, fresh, lbs. 89,039,739	7,786,514		
Beef, salted or pickled 33,332,691	1,865,625		
Tallow, lbs. 51,074,039	2,640,118		
Bacon, lbs. 190,648,577	16,218,948		
Hams, lbs. 21,559,524	2,577,151		
Pork (pickled), lbs. 34,841,468	2,650,100		
Lard, lbs. 201,068,330	16,964,676		
Oleomargarine (oil), lbs. 28,102,534	2,664,492		
Butter, lbs. 12,015,962	1,971,634		
Cheese, lbs. 68,809,093	6,298,337		
All other pro- visions 1,039,832			
	64,504,425	39,618,019	104,122,444
MINERAL OILS.			
Illuminating, gals. 354,378,595	\$28,083,946		
Lubricating, gals. 22,305,022	3,940,235		
Crude, gals. 42,089,455	3,070,941		
All other mineral oils, 954,834			
	36,049,956	13,863,721	49,913,677
TOBACCO.			
Leaf, lbs. 138,957,318	\$11,957,035		
Manufactured, 3,334,049			
	15,291,044	6,964,507	22,255,551
Manufactures of Cotton, Cattle, number, 75,004..	7,728,397	2,484,247	10,212,644
Leather, sole, lbs. 29,901,277.....	6,204,624	10,412,293	16,616,917
Oil cake and oil cake meal, lbs. 231,034,883	4,906,214	984,295	5,890,509
Furs and fur skins.....	3,032,066	3,895,846	6,927,912
	4,724,017	310,418	5,034,435
Total, leading articles of domestic merchandise,	\$235,922,049	\$346,704,011	\$582,626,060
Total, all other exports, domestic merchandise	75,006,102	72,650,447	147,656,549
Total domestic coin and bullion.....	69,724,274	10,490,720	80,214,994
Total exports domestic products 1888-89.	\$380,652,425	\$429,845,178	\$810,497,603

Foreign exports from New York for twenty years, ending December 31st:

Year.	Domestic Products.	Foreign Products.	Specie and Bullion.	Total Ex- ports.
1870.....	\$185,740,061	\$10,205,672	\$58,191,475	\$254,137,208
1871.....	225,553,247	9,112,990	63,865,546	298,531,783
1872.....	225,475,687	11,383,610	71,959,042	308,818,339
1873.....	288,707,357	11,538,048	48,659,661	348,905,066
1874.....	274,201,898	9,738,235	61,222,228	345,162,361
1875.....	247,681,724	8,780,444	67,556,650	324,018,818
1876.....	265,774,302	9,776,662	43,097,102	318,648,066
1877.....	290,060,048	7,973,923	27,497,169	326,431,140
1878.....	340,206,868	9,207,432	13,107,788	362,522,088
1879.....	349,471,680	6,746,885	14,828,044	371,046,609
1880.....	406,955,884	8,866,943	9,370,272	425,193,099
1881.....	358,479,834	14,656,536	12,623,831	385,760,201
1882.....	334,199,006	12,289,577	48,013,279	394,501,862
1883.....	337,093,193	12,349,233	19,390,005	368,832,431
1884.....	321,400,682	9,460,694	54,410,573	385,271,949
1885.....	321,149,580	9,669,113	24,641,266	355,459,959
1886.....	308,187,092	9,984,519	50,024,339	368,195,950
1887.....	304,021,758	8,998,923	21,046,701	334,067,382
1888.....	290,779,161	9,111,569	49,565,852	349,456,582
1889.....	336,785,436	9,074,152	71,685,395	417,545,010

Foreign imports into New York for twenty years, ending December 31st:

Year.	Dutiable Goods.	Free Goods.	Specie and Bullion.	Total Foreign Imports.
1870	\$289,618,878	\$13,716,500	\$11,864,644	\$315,200,022
1871	349,635,398	28,878,294	6,348,608	384,862,300
1872	369,083,458	57,429,020	5,594,208	432,106,686
1873	293,035,348	86,924,877	18,605,611	398,565,836
1874	278,677,532	108,598,631	6,407,571	393,683,734
1875	235,398,509	91,791,853	13,438,557	340,628,919
1876	202,486,773	76,659,977	26,217,888	305,364,638
1877	221,401,649	92,686,992	15,000,227	329,088,868
1878	201,540,213	82,495,681	19,150,973	303,186,867
1879	234,775,206	105,217,808	84,196,109	424,189,123
1880	337,250,149	126,926,531	75,210,096	539,386,776
1881	310,103,977	129,297,696	56,023,233	495,424,906
1882	359,357,163	132,876,823	7,694,788	499,928,774
1883	325,199,510	127,485,979	20,174,396	472,859,885
1884	287,165,930	126,591,112	27,010,641	440,767,683
1885	264,142,862	119,397,594	17,701,094	401,241,550
1886	298,234,553	134,846,667	38,999,519	472,089,739
1887	310,398,405	151,136,190	40,575,963	502,110,558
1888	301,008,039	154,865,981	8,206,303	464,080,323
1889	329,210,894	163,820,087	7,948,166	500,979,147

Classification of foreign imports at New York for three years, ending December 31st:

Year.	Dry Goods.	General Mer- chandise.	Specie and Bullion.	Total.
1887	\$121,743,445	\$339,791,150	\$40,575,963	\$502,110,558
1888	125,876,999	329,997,021	8,206,303	464,080,323
1889	136,692,868	356,338,113	7,948,166	500,979,147

Statistics of population of New York City:

Years.	Population.	Years.	Population.
1656	1,000	1820	123,706
1664	1,500	1825	166,086
1698	4,937	1830	202,589
1731	8,622	1835	268,089
1756	13,046	1840	312,710
1771	21,862	1845	371,223
1786	23,614	1850	515,547
1790	33,131	1855	629,810
1800	60,489	1860	805,658
1805	75,770	1865	726,386
1810	96,373	1870	942,292
1816	98,634	1880	1,206,299

The census returns place the present resident population of New York at 1,515,301, and the transient or floating population is large.

Statistics of manufacturing in New York City, 1880:

INDUSTRY.	No. of Estab-lishments.	Capital.	Yearly Value of Product.	Total Value of Product in entire U. S.
Artific'l Fth'rs and Flowers	141	\$1,090,100	\$4,298,684	\$4,879,324
Book Binding & Bln'k B'ks	114	2,340,650	4,927,886	11,976,764
Boots & Shoes	839	1,898,669	7,663,000	196,920,481
Carpentering..	460	1,745,782	7,096,315	94,152,139
Carriages and Wagons....	139	1,133,900	2,613,361	64,951,617
Men's Cloth'g	736	22,396,893	60,798,697	209,548,460
Women's Clothing..	230	4,805,665	18,930,553	32,004,794
Confectionery.	187	1,521,758	4,592,622	25,637,033
Drugs and Chemicals..	27	2,027,923	3,694,178	38,173,658
Flour & other Mill Prod'ts	15	1,870,625	6,229,926	505,185,712
Foundries and M'ch' Shops	287	10,635,508	14,710,835	214,378,408
Furniture ...	299	4,353,683	9,605,779	68,037,902
Furs, dressed.	60	1,950,875	4,474,018	8,238,712
Gas Fixtures and Lamps.	14	2,105,000	2,549,628	4,329,656
Hats & Caps.	111	1,033,575	4,008,503	21,303,107
Jewelry.....	240	2,531,838	5,002,198	22,201,621
Leather, tanned.....	9	1,065,500	1,161,177	113,348,336
Lithographing	48	1,227,550	1,738,452	6,912,938
Malt Liquors.	79	13,491,000	19,137,882	101,058,385
Malt.....	15	3,150,000	3,350,731	18,273,102
Marble and Stone Work	146	2,257,388	5,771,069	31,415,150
Millinery and Lace Goods.	88	1,251,180	5,153,080	9,577,849
Mixed Textil's	74	1,787,350	4,825,424	66,221,703
Paints.....	26	1,581,600	2,932,049	23,390,767
Paper Hangi'g	11	1,965,000	3,499,143	6,267,303
Printing and Publishing .	412	14,774,929	21,696,354	90,789,341
Ship building.	79	1,409,100	2,071,005	36,800,327
Shirts.....	64	1,647,700	5,608,015	20,130,031
Silk and Silk Goods.....	126	3,431,450	7,800,250	41,033,045
Silverware....	16	1,049,600	1,587,600	2,253,630
Meat Packing.	58	1,801,000	29,297,527	303,562,413
Soap and Can- dles.....	30	2,931,325	3,697,964	26,552,627
Stationery Goods.....	73	1,500,925	3,179,734	5,898,322
Sugar Refin'g	5	2,730,000	11,330,883	155,484,915
Tobacco, chew- ing, etc.....	17	1,015,540	4,320,972	52,793,056
Tobacco, Cig's & Cigaretts	761	5,858,448	18,347,108	63,979,575
Other Indus- tries	5,303	51,836,327	155,223,835	
Totals....	11,339	\$181,206,356	\$472,926,437	
Totals for U. S....	253,852	\$2,790,272,606	\$5,369,579,191	

Statistics of savings banks of New York City for ten years :

DATE.	No. of Banks.	Amt. of Deposits.	No. of Depositors.	Average due each Depositor.
Jan. 1, 1881	25	\$193,235,538	504,921	\$382.70
" 1882	25	211,148,385	549,081	384.55
" 1883	25	225,522,914	580,333	388.61
" 1884	25	237,778,355	607,894	391.15
" 1885	25	244,425,371	618,088	395.45
" 1886	24	255,946,181	640,524	399.59
" 1887	24	270,569,389	669,556	404.10
" 1888	24	283,350,552	699,510	405.07
" 1889	24	293,269,285	715,413	409.93
" 1890	25	307,773,288	745,383	412.90

Assessed valuation of real and personal estate in New York City, 1874 to 1889, both inclusive:

YEARS.	Value of Real Estate.	Value of Per-sonal Estate.	Total.
1874.....	\$881,547,995	\$272,481,181	\$1,154,029,176
1875.....	883,643,545	217,300,154	1,100,943,699
1876.....	892,428,165	218,626,178	1,111,054,343
1877.....	895,063,933	206,028,160	1,101,092,093
1878.....	900,855,700	197,532,075	1,098,387,775
1879.....	918,134,380	175,934,955	1,094,069,335
1880.....	942,571,690	201,194,037	1,143,765,727
1881.....	976,735,199	209,212,899	1,185,948,098
1882.....	1,035,203,816	198,272,582	1,233,476,398
1883.....	1,079,130,669	197,546,495	1,276,677,164
1884.....	1,119,761,597	218,536,746	1,338,298,343
1885.....	1,168,443,137	202,673,866	1,371,117,003
1886.....	1,203,941,065	217,027,221	1,420,968,286
1887.....	1,254,491,849	253,148,824	1,507,640,663
1888.....	1,302,818,879	250,623,552	1,553,442,431
1889.....	1,331,578,291	272,260,822	1,603,839,113

Number and nationalities of alien immigrants arriving at the port of New York during five years ending June 30th:

	FROM	1885.	1886.	1887.	1888.	1889
UNITED KINGDOM;						
England.....	33,834	35,879	52,970	56,620	50,535	
Ireland.....	36,525	34,357	46,866	48,796	45,282	
Scotland.....	6,279	8,683	13,990	17,413	13,016	
Wales.....	985	899	1,593	1,177	750	
Great Britain....	27	9	4	5	12	
Total United Kingdom	77,650	79,827	115,423	124,011	109,596	
CONTINENTAL EUROPE;						
Austria.....	10,977	10,416	18,316	23,533	17,690	
Bohemia.....	5,817	3,849	2,716	2,204	1,774	
Hungary.....	9,059	12,134	14,124	14,773	10,341	
Belgium.....	1,482	1,254	2,219	2,770	2,230	
Denmark.....	5,713	5,779	7,497	8,073	7,850	
France.....	2,845	2,861	4,321	5,325	4,024	
Germany.....	106,856	71,696	76,941	81,481	73,586	
Gibraltar.....	....	7	12	9	13	
Greece.....	161	102	310	764	80	
Italy.....	12,725	20,472	46,474	49,762	23,272	
Sicily.....	43	20	90	483	3	
Malta.....	4	7	1	2	....	
Netherlands....	2,596	2,252	4,422	5,681	6,399	
Norway.....	9,036	9,730	12,798	14,993	10,948	
Portugal	26	70	27	9	18	
Roumania... ..	779	476	2,033	1,139	798	
Russia.....	15,814	16,126	24,824	26,824	26,348	
Finland.....	381	368	1,022	1,578	1,844	
Poland.....	2,370	3,143	4,388	3,972	3,312	
Spain.....	261	284	334	386	399	
Sweden.....	16,177	20,135	31,681	41,859	29,108	
Switzerland.....	5,812	4,710	5,026	7,656	6,986	
Turkey in Europe	96	164	200	165	207	
Other Countries.	2	....	....	2	....	
Total	209,032	186,035	259,776	293,443	228,098	
Total Europe	286,682	265,862	375,199	417,454	337,693	
ASIA.....	92	64	317	313	449	
All other Countries...	449	444	489	656	642	
Total arrivals at New York.....	287,223	266,370	376,005	418,423	338,784	
Total arrivals in U. S.	395,346	334,203	490,109	546,889	444,427	
Per cent. arrived in New York.....	72.65	79.70	76.72	76.51	76.24	

Although a very large proportion of the business of New York, notably in the dry goods, clothing, and similar trades, is transacted in separate stores, and by a system of public auctions, it is probably true that the larger part is done at the various exchanges, where buyers and sellers of securities and commodities meet in person or through their brokers, and prices are fixed by the constant fluctuation of supply and demand. The STOCK EXCHANGE occupies a handsome five-story building of white marble, with a frontage of seventy

feet on Broad street, and 162 feet on New street, with an L running though to Wall street. Membership is limited to 1,100, each "seat" being worth about \$30,000. The recorded daily transactions in stocks, bonds and government securities amount to many millions, while the private unrecorded transactions among the members probably amount to as many more. A "gratuity fund" provides for the payment of \$10,000 to the heirs of every member dying, without any deduction whatever. In case of the death of any member his "seat" is disposed of by the governing committee, and the proceeds applied to payment of any dues or liabilities to the exchange or its members, the balance being handed to his heirs. Members are prohibited from holding seats in any other exchange dealing in stocks and bonds, and from engaging in partnership with other persons holding such seats. The CONSOLIDATED STOCK AND PETROLEUM EXCHANGE is a rapidly rising rival of the Stock Exchange, formed by the consolidation of the American Mining Stock Exchange, the National Petroleum Exchange, the Miscellaneous Security Board, and the New York Petroleum Exchange and Stock Board. It occupies a massive building 91 feet on Broadway, 132 feet on Exchange place, and 87 feet on New street. A feature of this exchange is its clearing system for transactions in securities. The PRODUCE EXCHANGE is claimed to be the largest organization of its kind in the world. Its membership is 3,000; and almost all the large transactions in breadstuffs and provisions are made on its floor. It occupies a magnificent building covering the entire block bounded by Whitehall, Beaver, New, and Stone streets. The COTTON EXCHANGE, founded in 1871, occupies a large building on Hanover square, Beaver street and William street. The COFFEE EXCHANGE, on Pearl and Beaver streets, dates from 1882, and has a membership of over 300. The METAL EXCHANGE, on the corner of Pearl street and Burling slip, has about 400 members. THE MARITIME EXCHANGE, located in the Produce Exchange Building, deals in vessel charters and freightages; one of its features is a reading room equipped with standard works and periodicals relating to shipping interests of every kind. The BUILDING EXCHANGE, No. 12 Dey street, deals in building materials of every kind. The REAL ESTATE EXCHANGE, 57 Liberty street, is devoted to the sale of real estate, chiefly by auction, and within the limits of the city. The MERCANTILE EXCHANGE, corner Harrison and Hudson streets, is an outgrowth of the former Butter and Egg Exchange, and deals in butter, cheese, eggs, and preserved provisions. It has about 800 members.

The incorporated banks of discount and deposit are eighty-eight in number, forty-six being organized as National Banks, and forty-two doing business under state charters. The business centers in the clearing house, composed of sixty-three banks and the assistant treasurer of the United States, to which institution each bank pays daily whatever balance may be due by it in settlement with all other banks, or from which it receives whatever balance may be similarly due to it. Banks, not members of the clearing house, make their clearances through the agency of banks belonging to the association. The total business transacted at the clearing house during 1889 was as follows:

Total exchanges, 1889.....	\$35,895,104,904.65
Total balances, 1889.....	1,748,800,679.20

The condition of the New York banks, both national and State, as shown by their quarterly statement, December 4, 1889, was as follows:

LIABILITIES.

Capital	\$ 65,912,700
Surplus and Net Profits.....	59,428,500
Circulation	3,991,500
Due Banks	150,720,200
Deposits.....	302,725,500
Sundries	206,300

\$582,984,700

RESOURCES.

Loans and Discounts.....	\$376,271,900
Stocks.....	38,703,000
Real Estate	15,005,800
Due from Banks	42,011,700
Cash Items and Bank Notes.....	4,480,200
Specie.....	78,723,700
Legal Tenders	27,362,100
Sundries	426,300

\$582,984,700

The private banking business conducted in New York is of enormous extent, and embraces the chief financial transactions of the country.

The water supply of New York is obtained chiefly from the Croton river, a small stream in Westchester county, about forty miles distant, whence it is brought by aqueduct, crossing the Harlem river on a lofty bridge, and distributed by service pipes throughout the city. The present daily consumption is about 100,000,000 gallons, which compels the use of the aqueduct to its full capacity. A retaining reservoir in Central Park has a capacity of 1,000,000,000 gallons, and storage reservoirs at Croton lake, Boyd's Corners, and the middle branch have capacity for about 10,000,000,000 gallons more, in all about three months' supply. Pumping engines and towers are used to supply the more elevated parts of the city. The yearly cost is about \$1,500,000, which is defrayed by a tax on buildings, supplemented by special charges where water is used for boilers or manufacturing purposes. The system is under control of the department of public works. A new conduit is now (1890) in process of construction, and nearly completed, being a tunnel through solid rock, at an average depth of 200 feet below the surface, in an almost direct line from Croton lake. This will have a capacity of more than 300,000,000 gallons daily, and is expected to suffice for the wants of the entire city for many years to come.

The hospitals of New York are numerous, and excellently managed. Thirty dispensaries, at central points, provide free medical advice and remedies. The asylums for orphans, aged and helpless persons, insane, etc., are well supported and managed. Among the prominent benevolent associations are: The Association for the Improved Instruction of Deaf Mutes, where pupils are taught to use articulate sounds; the Catholic Protector, for the care and reformation of vicious children; the Children's Aid Society, which supports several newsboys' lodging houses and other refuges and schools for children; the Five Points House of Industry; the Home for Inebriates; the Leake and Watts Orphan House; the Roman Catholic Orphan Asylum; St. John's Guild, for furnishing health-excursions and seaside visits to the poor; the Sheltering Arms, for homeless children between two and ten years, for whom no other institution provides; the Society to Befriend Working Girls, for sheltering and teaching young women out of work; the United Hebrew Charities of the City of New York, for aiding and relieving the worthy Hebrew poor. Beside these, a very large number of "homes," asylums and institutions for various branches of charity are supported by church congregations or organized private benevolence.

The correctional institutions are the penitentiary, alms

house and workhouse, on Blackwell's Island, to which criminals convicted in the city courts are sentenced for short terms. The city prison proper, generally called the Tombs, a massive building in Egyptian style, occupies the entire block bounded by Centre, Elm, Leonard and Franklin streets. Minor prisons, for the temporary detention of prisoners awaiting trial, are attached to the several police courts.

The public schools under control of the city comprise forty-five grammar schools for males, forty-seven grammar schools for females, thirteen grammar schools for both sexes, seventy-eight primary departments of grammar schools, thirty-nine separate primary schools, forty-eight industrial schools, reformatories, etc., twenty-nine evening schools, one nautical school, one normal college for training teachers, one training school, and one College of the City of New York. Among the incorporated educational institutions of New York the principal are: Columbia College, embracing schools of arts, mines, law, political science, and medicine; the University of the City of New York, with schools of art and science, law, and medicine; Bellevue Hospital Medical College, College of Pharmacy, College of Dentistry, St. Francis Xavier's College and St. John's College, under control of the Jesuit Fathers; Manhattan College, under control of the Christian Brothers of the Roman Catholic church; Academy of Mount St. Vincent, for girls, under control of Sisters of Charity; Academy of the Sacred Heart, for girls, under control of Ladies of the Sacred Heart; General Theological Seminary of the Protestant Episcopal church; Union Theological Seminary, and art schools of the National Academy of Design. The Cooper Union, founded by the late Peter Cooper, offers free courses to males and females in art, various sciences, wood engraving, stenography, and type-writing.

Although New York may fairly be regarded as the literary center of the United States, its libraries are somewhat inadequately equipped for purposes of reference and research.

The parks are a feature of New York of which the city is justly proud. Central Park, containing about 840 acres, lies between 59th and 110th streets, and Fifth and Eighth avenues. It is laid out in a system of roads, bridle-paths, and footpaths, with constantly varying landscape effects of thicket, lawn, and rugged rock; the natural features of the locality having been made the groundwork of all subsequent improvements. The carriage ways or drives are about nine miles long; the bridle-paths more than five miles, and the footpaths twenty-eight miles. The numerous bridges are built each from a special design to harmonize with the surroundings. A winding lake, with jutting points and deep bays, is gay with pleasure boats in summer and throngs of skaters in the winter; a broad paved esplanade gives access to it, led up to by a spacious mall or avenue, bordered with noble trees and green-sward, and adorned with numerous statues of historic characters. Small lakes are scattered through the park, and a labyrinthine footpath, known as the Ramble, is crossed by numerous romantic rivulets. Among the notable features of Central Park are the menagerie, the Museum of Natural History, and the Metropolitan Museum of Art, which contains the celebrated Cesnola collection of Cyprus antiquities, and the famous Egyptian obelisk, Cleopatra's Needle. Riverside Park, or more properly Drive, is an attraction such as no other city in the world possesses. It extends along the bluffs skirting the North river from 72nd to 130th street, terminating in a lofty eminence named Claremont, on which is situated the tomb of General Grant, and whence extends a wonderful view of the broad and busy

river stretching to the north. Riverside is fast becoming the fashionable drive, and numerous handsome residences already line its landward side. Morningside Park comprises a narrow strip of land lying at the foot of Bloomingdale Heights, north of Central Park; and although not yet completed, is already very beautiful. It is overlooked by the site on which will stand the new Episcopal cathedral. Mount Morris Park, between 120th and 124th streets, though containing only twenty acres, is one of the most beautiful parks in the city. A rocky peak, over 100 feet high, rises in its center, and winding paths lead to an observatory on its summit. In the annexed district, land has recently been acquired for six new parks: Pelham Bay, containing about 1,700 acres, with a shore line of nine miles on Long Island Sound; Bronx, containing 653 acres, near Williams Bridge, on the northern city line; Van Cortlandt, just south of the city of Yonkers, containing about 1,000 acres; Crotona, St. Mary's, and Claremont, containing respectively 135, 25, and 38 acres. The Battery, the most ancient park in the city, is also one of the most beautiful, though disfigured by the elevated roads which wind along its side. It occupies the extreme southern point of Manhattan Island, and the salt breezes from the bay make it a delightfully cool resort in summer. "Castle Garden," within the limits of the Battery, was until very lately the landing place for all immigrants arriving in New York; but Ellis' Island, in the bay, has now been set apart for that purpose.

YEARS.		
1881	16	Dwelling houses costing over \$50,000.
1882	20	
1883	10	Dwelling houses costing over \$20,000.
1884	4	
1885	4	
1886	5	
1887	18	
1888	2	
1889	48	
Spring of 1890	2	
1881	157	Dwelling houses costing less than \$20,000.
1882	767	
1883	477	
1884	379	
1885	465	
1886	855	
1887	1,144	
1888	895	
1889	470	
1890	525	
1890	152	
1881	356	Apartment houses costing over \$15,000.
1882	577	
1883	315	
1884	182	
1885	689	
1886	1,174	
1887	1,494	
1888	1,076	
1889	1,355	
1890	304	
1881	808	Tenement houses costing less than \$15,000.
1882	691	
1883	886	
1884	1,013	
1885	584	
1886	448	
1887	346	
1888	195	
1889	194	
1890	31	
1881	9	Hotels.
1882	8	
1883	6	
1884	5	
1885	3	
1886	5	
1887	2	
1888	2	
1889	16	
1890	4	
1881	33	Stores costing over \$30,000.
1882	40	
1883	35	
1884	22	
1885	20	
1886	28	
1887	25	
1888	25	
1889	52	
1890	22	
1881	20	Stores costing over \$15,000.
1882	31	
1883	23	
1884	45	
1885	59	
1886	18	
1887	47	
1888	77	
1889	90	
1890	56	
1890	16	
1881	23	Office buildings.
1882	25	
1883	27	
1884	22	
1885	24	
1886	26	
1887	32	
1888	28	
1889	22	
1890	11	
1881	116	Factories.
1882	137	
1883	133	
1884	140	
1885	166	
1886	160	
1887	141	
1888	149	
1889	151	
1890	38	
1881	6	Schools.
1882	4	
1883	4	
1884	5	
1885	8	
1886	17	
1887	11	
1888	8	
1889	19	
1890	1	
1881	8	Churches.
1882	6	
1883	11	
1884	6	
1885	11	
1886	2	
1887	14	
1888	35	
1889	18	
1890	5	
1881	21	Municipal buildings.
1882	12	
1883	16	
1884	20	
1885	13	
1886	12	
1887	9	
1888	10	
1889	32	
1890	3	
1881	139	Theaters.
1882	130	
1883	85	
1884	91	
1885	151	
1886	58,739,733	
1887	67,069,570	
1888	47,289,145	
1889	69,504,872	
1890	19,088,997	
1890	\$43,391,300	Total cost of buildings.

STATISTICS OF BUILDING OPERATIONS.

The older buildings in New York, except some public edifices, show little architectural beauty; but of late years many very handsome structures have been built, the use of elevators permitting extraordinary height where necessary. The materials employed are of the most various description, granite, brick, marble, Caen stone, native brown stone, iron etc., the designs presenting examples of every style, Greek, Roman, Italian, Renaissance, etc., frequently with daring modifications. The new Pulitzer building, for the publication rooms of the *New York World*, built of brick, Scotch sandstone, granite, and iron, rises eleven stories to the roof, above which a circular tower, fifty feet in diameter, rises five stories higher, making a total height from the pavement of 311 feet, with a depth below the street level of thirty feet. The buildings of the *Tribune* and *Times* are also noteworthy, the former of brick with stone trimmings, and the latter of granite. The W. S. Barge office at the Battery, the vast Produce Exchange with its tower rising 200 feet, the buildings of the Equitable and Mutual Life Insurance Companies, the City Hall, the Custom House, and most of the magnificent new office buildings in and around Wall street, are all well worth attention. Among the churches, St. Patrick's cathedral on Fifth avenue is the most striking. It is of pure white marble, with base course of granite, built in Gothic style, with towers 330 feet high. Trinity church on Broadway, fronting Wall street, is a stately Gothic edifice of brown stone, with steeple rising 284 feet. St. Paul's chapel on Broadway and Vesey street, and St. John's on Lighthouse street, are beautiful specimens of colonial architecture.

History.—The first settlement on Manhattan Island was made in 1613, when Captain Hendrik Christiaensen, representing an association of Dutch merchants, erected a redoubt and four small houses on the site of the present No. 39 Broadway. The promoters of the settlement were fur dealers who had long been engaged in trade with Archangel, but found their commerce impeded by the heavy duties and other imposts levied by the Russian government, and therefore sought to establish, in the New World, a station where they might enjoy liberty of trade. The venture proving successful, the Dutch merchants organized themselves under the style of the "United New Netherland Company," and secured from the States General of Holland a charter granting them a monopoly of trade with North America between the 40th and 45th parallels of N. latitude. This charter expired in 1618, and the application for its renewal was refused, though the company was allowed to continue trading for several years longer, under a special license. The reports of the fertility and other advantages of the country attracted general attention, and after the expiration of the charter of the New Netherland Company, the English Puritans, who were then arranging for their famous emigration, requested permission to settle in the new province. The States General, however, thought it wiser to establish a purely Dutch population, and on June 3, 1621, granted a charter to the West India Company, conferring on them exclusive rights over the territory of "New Netherlands" for twenty years; the company agreeing in return to colonize the province within a reasonable time. Thirty families of settlers were accordingly forwarded in 1623, chiefly French protestants, who had sought a refuge in Holland from persecution in their native country. An additional number of emigrants, with their families, were dispatched in 1625, together with a supply of farming implements and more than 100 head of cattle; and by the beginning of the year 1626 the population numbered about 200 souls. In that year Peter Minuit was appointed Director-General of the

new colony, and the territory of Manhattan Island was purchased from the Indians for sixty guilders, or about twenty-four dollars. Emigration from all countries was encouraged by the proprietary company, who furnished transportation at low prices, gave free grants of land, and proclaimed universal religious toleration. The company, however, reserved to itself the monopoly of the fur trade, and levied a duty of 5 per cent. on all other commerce. In 1633 Minuit was superseded as director-general by Wouter Van Twiller, a church and school-house were erected, and the first ordained pastor was installed. A number of negroes were imported from the Dutch West Indian possessions, and slavery became one of the institutions of the colony. The settlement on Manhattan island began at this time to be known as New Amsterdam. In March, 1638, William Kieft was appointed director-general, and endeavoring to enforce the payment of taxes by the neighboring Indians, provoked a war, in which the colony suffered greatly. In 1642 the first tavern was erected, at the company's expense, at the head of what was afterward Coenties Slip; the building was afterward altered into the "Stadt Huys," or City Hall. In 1647 Kieft was succeeded by Peter Stuyvesant, the last of the Dutch governors. By the year 1664 the population of New Amsterdam had increased to 1,500; ferries and markets had been established, and the streets were laid out with some degree of regularity; several distilleries and breweries were in operation, and a number of vessels had been built.

In September, 1664, an English fleet appeared before the city and demanded possession in the name of the Duke of York, to whom Charles II. had granted a patent including all lands and rivers from the Connecticut river to Delaware bay. Great Britain and Holland were at that time at peace, and the city being entirely defenseless, a surrender was inevitable. The British took possession, installed Colonel Nicholls as governor, and changed the name of the city to New York. The first charter of the city was granted by Governor Nicholls June 12, 1665. It placed the executive power in the hands of a mayor, sheriff, and five aldermen, all to be appointed by the governor. Thomas Willett was at the same time appointed the first mayor. In July, 1673, during the war between England and Holland, the Dutch regained possession, rechristened the city New Orange, and held it until 1674, when it again passed into English hands, its surrender being called for by the treaty of peace between the two parent countries. Under the Second Dutch administration the town was extensively fortified; a strong palisade was erected along the present Wall street, and numerous redoubts and blockhouses in other quarters. The city at this time was sparsely built, and presented but few of its present features. The East river reached to Pearl street, then known as the "Strand," or "Waterside," and the North river to the present Greenwich street. A canal or creek, walled with piles on either side, extended along the present Broad street to near the city wall.

With the year 1674 the history of the city under British dominion begins. Edmund Andross, afterward known in the Eastern colonies as "The tyrant of New England," was installed as governor, and one of his first acts was to refuse the prayer of the people of the city and colony for a representative assembly. He was succeeded in 1683 by Governor Dongan, under whom the first legislative assembly of the colony met in New York October 17, 1683. In 1686 the "Dongan charter," which has ever since been the basis of the municipal rights of the city, was granted. It conferred on the municipality jurisdiction over the entire island of Manhattan, to low water mark of the bays and rivers round

it; retained to the governor the appointment of the mayor, recorder, sheriff, coroner, high constable, town clerk, and clerk of markets; and provided for the election of aldermen, assistant aldermen, and petty constables annually. A new seal was also granted the city, bearing the beaver of the Dutch municipality, with the addition of a flour barrel and the arms of a windmill, supported by two Indian chiefs. In 1689, on arrival of news of the English Revolution, a large number of prominent citizens, under the leadership of the governor (Nicholson) were disposed to hold the city and colony for King James; the popular party, however, under the leadership of Jacob Leisler, a wealthy burgher of Dutch birth, rose up and seized the fort, expelled the Jacobite governor, and installed Leisler in authority. Meantime, Colonel Slaughter had been commissioned as governor by William and Mary. On his arrival in March, 1691, Leisler was arrested, tried for high treason, and condemned to death; the governor, however, refused to sign the warrant for his execution, but was finally persuaded to do so while intoxicated, and Leisler, with a son-in-law who had acted as his aid-de-camp, was hanged. The judgment was afterward reversed by the English Government, and Leisler's estates were restored to his children. For many years subsequently, the popular party among the citizens were known as "Leislerians." In 1696 the first Trinity church was erected, the Rev. William Vesey being installed as first rector, and the buryingground around the church being donated by the corporation. In 1699 a new city hall was erected on the corner of Wall and Broad streets. Toward the close of the seventeenth century, an undeniable notoriety attached to the city, as the headquarters of an organized system of piracy, the governor himself being accused of complicity. The famous Captain Kidd, a New York shipmaster, was commissioned by the authorities to proceed against the pirates, but hoisted the black flag, and returned to New York in 1698, after a most successful "cruise," with his ship laden with booty. Kidd was finally arrested in Boston and sent to England, where he was tried and hanged. In the year 1699 the property of the city was assessed for taxation at \$391,155. In 1705 the first free grammar school was established in the city. In 1725 the first newspaper, the *New York Weekly Gazette*, was established. An opposition paper, the *New York Weekly Journal*, was started in 1733. In 1730 Governor Montgomerie granted a new charter extending the jurisdiction of the city over the islands in the bay and East river, and authorizing the municipality to establish ferries, docks, and market-houses, and to enact ordinances for the government of the city. The first public almshouse was established in 1734. In 1741 the community was panic-stricken by the reported discovery of a plot among the slaves to burn the town and murder the whites; a number of whites and negroes were condemned and executed, fourteen of the latter being burned alive. The first theater was erected in 1750. In 1752 the first merchants' exchange was opened. In 1754 King's College, now Columbia, was founded. The chamber of commerce was chartered March 13, 1770. In the preliminary struggles of the Revolution New York took a prominent and decided part. The sympathies of the wealthier and more aristocratic portion of the community were largely with the British Government, but the middle and lower classes were imbued with the spirit of liberty, and carried all before them. The stamp act was energetically resisted, the stamp office razed to the ground, quantities of stamps destroyed, and public notices posted denouncing and threatening any person using stamped paper. The attempted imposition of the duty on tea was resisted with spirit; a cargo

brought by the ship *Nancy* was thrown into the bay April 22, 1774, and a few chests which had been smuggled ashore were seized and destroyed. During the greater part of the Revolutionary war New York remained in the possession of the British forces, who occupied it in September, 1776, after defeating Washington in the battles of Long Island and Harlem Plains. The night previous to the occupation a fire broke out on Broad street and destroyed about 500 buildings. Another in 1778 destroyed almost the entire eastern side of the town. The city was finally evacuated by the British troops November 25, 1783, about a thousand Tory families accompanying them. The first congress of the United States assembled in New York March 4, 1789; and on April 30th of the same year, George Washington was inaugurated president of the new republic at Federal Hall, on the site of the present sub-treasury building. For a short time after his inauguration, Washington occupied a house belonging to Samuel Osgood, at No. 1 Cherry street; but he soon removed to the Macomb house, No. 39 Broadway, the identical spot on which the first buildings were erected by Europeans on the island. But for a political intrigue New York might have remained the national capital, and the city of Washington might never have been founded. During the first session of congress it was proposed that the general government should assume, not only the debts contracted by the continental congress during the Revolutionary war, as to which there was no difference of opinion, but also the debts of the several States incurred during the same period, amounting to about \$25,000,000. This proposition was strongly opposed by the members from Maryland, Virginia, Georgia, and New Hampshire, States whose debts were comparatively insignificant, and many members from Pennsylvania joined in the opposition. Finally, through the agency of Thomas Jefferson and Alexander Hamilton, a compromise was effected. The members from Virginia and Maryland were induced to withdraw their opposition by an agreement that the seat of government should be permanently located in the District of Columbia, and the Pennsylvania members were conciliated by a pledge that before its final establishment at Washington the government should be transferred to Philadelphia for a term of ten years. During the Reign of Terror in Paris, New York became the refuge of a large number of French emigrants; and though many of these returned to France after the downfall of Robespierre, they left an impression on the social life of the city which has never been effaced. From 1784 to 1797 New York was the capital of the State of the same name. In 1798 occurred an epidemic of yellow fever, destroying 2,100 lives out of a population of about 55,000.

At the beginning of the nineteenth century the city proper had extended as far as Anthony street on Broadway, and Harrison street on the North river; the houses, however, were scattering, except at the lower part of the island, and surrounded by large gardens and vacant lots. Broadway had been graded as far as Canal street, where a stone bridge (now buried entire beneath the street) spanned a canal leading from the Collect Pond to the North river. The streets were numbered, and many of them furnished with brick sidewalks. The fashionable streets were Pearl, Nassau, and Pine streets, and the region adjacent to the present Battery park. The City Hall was at the junction of Nassau and Wall streets; the Almshouse, Bridewell, and prison occupied a portion of the present City Hall park. The Potter's Field was the present Washington square. The assessed value of taxable property was about \$7,000,000, on which the tax was generally one-

half of one per cent. Mechanics' wages averaged \$1 a day. A good house could be bought for \$3,000, or rented for \$350 a year.

In 1805 the public school society was founded, chiefly by Quakers, and its first school, No. 1, was opened May 17, 1806, in Madison street, near Pearl, with forty scholars. School No. 2 was opened in 1811, and other schools were thereafter added until 1842, when the present ward school system was established; the society, however, continued its operations till 1853, when its charter was relinquished, and its property turned over to the corporation. August 7, 1807, the first steamboat, the Clermont, made her first trip to Albany. In the same year the commercial progress of the city was checked by the operation of the National Embargo Act, prohibiting foreign commerce of every kind. This vexatious interference with trade continued, with some intermission, until April 19, 1812, when war with England was declared. At the outbreak of the war New York was practically undefended by any fortifications; and it was not till the spring of 1814, when the city was threatened by a British fleet, that the citizens took the matter into their own hands, and erected a chain of forts and batteries covering the approaches from the sea, and from the landward side. During the war trade was paralyzed, though much wealth was brought into the city by privateers. In 1811 the plan on which the city is now laid out was adopted; the streets, from the first on each side of the Bowery above Houston street, being numbered upward to the extreme end of the island, and the lines of the present avenues settled. Public parks were located on common lands, and at the junctions of ancient thoroughfares with the new avenues. Potter's Field became Washington Square; the junction of the Bowery and Broadway, Union Square; the junction of the Old and Middle Roads, Madison Square; and the great salt meadow on the east side was designated for draining and improving into Tompkins Square. In 1823 the city was again visited by an epidemic of yellow fever; the citizens deserted their dwellings, and took refuge in the northern part of the island, chiefly in Greenwich Village, in what is now the ninth ward, whither the banks, custom house, and public offices of every kind were removed; the infected district below the present City Hall park was walled up and all intercourse forbidden; owing to which precautions, the deaths were only 240 during the four months that the epidemic continued. In 1823 the first gas mains were laid in the streets.

The opening of the Erie canal in 1825 marked the beginning of the era of New York's present unexampled prosperity. Up to that time she had competed on comparatively equal terms with her sister cities of the Atlantic coast; but in the Erie canal she enjoyed a gateway to the rapidly growing West, which enabled her to set all competition at defiance, so that when railways were introduced New York had such control over the commerce between the East and West as to make her the unquestioned railway center of the country—the point from which all trunk lines must radiate if they would command a just proportion of the traffic. The statistics given elsewhere in this article show how rapid has been her progress.

In 1834 an amendment to the State constitution bestowed on New York, for the first time, the right of electing her own mayor, Cornelius W. Lawrence being the first officer so chosen. At the spring elections of the same year a proposal for supplying the city with water from the Croton river was submitted to popular vote, and adopted by a large majority. The construction of an aqueduct, forty miles in length, was at once

begun; and on July 4, 1842, the Croton water system was formally opened. December 16, 1835, a fire broke out in the lower part of the city, which raged for three days, and destroyed 648 houses and stores, with \$18,000,000 worth of property. The first transatlantic steamships, the Sirius and Great Western, arrived in port April 23, 1841. The first telegraph line connecting New York with Washington was opened in 1845; it was followed by a line to Albany, and other lines were opened in quick succession. May 10, 1849, the opposition of the "Native American" or "Know Nothing" party to the English actor Macready culminated in the attempt by a mob to burn the Astor Place opera house, where the actor was performing. A serious riot ensued, which was not quelled until the military had been called out, and several people killed and over 150 wounded. July 14, 1853, the "World's Fair for the Exhibition of the Industry of all Nations" was opened at the Crystal Palace on Reservoir Square. The palace was destroyed by fire October 5, 1858. In November, 1853, a commission was appointed to value land to be condemned for Central Park; the commission completed its labors in 1855, valuing the land at \$5,398,695; and the purchase was consummated by ordinance of the common council, February 5, 1856, \$1,658,395 of the purchase money being levied on the owners of adjacent property. The State arsenal and grounds were afterward bought for \$275,000. May 19, 1856, the mayor and street commissioners were appointed commissioners of Central Park; but work was not begun on any definite plan until April 17, 1857, when the control of the park was placed in the hands of a special board of commissioners. In the spring of 1857 the legislature amended the charter of the city by transferring the control of the police department from the mayor to a board of commissioners appointed by the governor. Mayor Fernando Wood declared the law unconstitutional, and refused to transfer the control of the police; and for a short time two distinct police forces were in existence. The dispute culminated in an attempt to arrest the mayor, which was forcibly resisted. The military were called out, and the mayor yielded; but the dissatisfaction of the "roughs" found expression in a riot on the east side of the city, which lasted several days, and involved serious loss of life.

The history of New York during the civil war is part of the history of the country. Although connected with the South by strong commercial ties, the people of the city were enthusiastic in their support of the Federal government and gave freely of men and money, furnishing a total of 116,382 men and officers. April 25, 1861, a meeting of ladies organized the Central Relief Association, which was afterward enlarged into the United States Sanitary Commission. In July, 1863, occurred the terrible draft riots, during which a number of mobs held possession of the city for three days; the killed and wounded were estimated by the police at 1,000. The city subsequently paid \$1,500,000 in indemnification for property destroyed. On May 2, 1865, the paid fire department was organized. In 1871 the celebrated Tweed Ring were hurled from power by the popular vote, and the action of the courts; but not until they had increased the city debt from \$50,000,000 to more than \$110,000,000, besides plundering the municipality in other ways. Since the close of the war the growth of New York has been steady and unprecedentedly rapid. The rush of settlement to the West, the growth of national population, the vast extension of the national railway system, the many inventions and improvements in labor-saving machinery, have all resulted in pouring upon her a steadily increasing flood of wealth. The centennial celebration of the founding of the

United States Government, and the first inauguration of Washington, on the three days ending May 1, 1889, was the last event of importance in the municipal history, and illustrated, with startling effect, the progress made by the city in a single century. Following in the footsteps of the first president of the republic, President Harrison landed at the foot of Wall street, attended service in St. Paul's chapel, and addressed the people from the site of Federal Hall. But the landing place which, in Washington's day, was well above the limits of the shipping, is now one of the first of the long line of wharves that line the East river shores; the church that then was almost in the country, is now miles from the residence district, and a day's march south of the city limits; the building which in Washington's day sufficed for all the departments of the national government, is now replaced by a far larger structure, whose capacity is taxed for the accommodation of a single branch of the treasury department; and the strangers who thronged New York to witness the celebration of 1889 exceeded, more than tenfold, the entire population of the city which bade Washington welcome.

Government.—The executive branch of the city government is administered by the following officials:

TITLE AND HOW CHOSEN.		Salaries.
Mayor, elected.....		\$12,000
Commissioner of public works, appointed by mayor.....		8,000
Commissioner of street cleaning, appointed by mayor....		6,000
Three commissioners of taxes and as- (President.....		5,000
sessments, appointed by mayor....	Other members	4,000
Four commissioners of police, appointed (President.....		8,000
by mayor.....	Other members	5,000
Three commissioners of docks, ap- (President.....		6,500
pointed by mayor.....	Other members	3,000
Four commissioners of parks, ap- (President.....		5,000
pointed by mayor.....	Other members	No sal.
* Two commissioners of health, ap- (President.....		5,000
pointed by mayor.....	Other members	4,000
Three commissioners of public charities and correction,		
appointed by mayor.....		5,000
Three commissioners of fire department, appointed by		
mayor.....		5,000
Three commissioners of excise, appointed by mayor.....		5,000
Comptroller, elected.....		10,000
Chamberlain, appointed by mayor.....		25,000
Two commissioners of accounts, appointed by mayor....		5,000
Corporation counsel, appointed by mayor.....		12,000
Corporation attorney appointed.....		4,000
Public administrator, appointed.....		4,000

* The president of the board of police is *ex-officio* a commissioner of health, but receives no salary on that account.

The legislative branch consists of a board of twenty-five aldermen, elected annually; and a board of estimate and apportionment, composed of the mayor, comptroller, president of the board of aldermen, and president of the department of taxes and assessments. The powers of the board of aldermen are limited to the enacting of ordinances, the granting of franchises for proper consideration or rental, and the formal voting of the tax levy settled by the board of estimate and apportionment. The board of estimate and apportionment are required to make yearly, between August and November, a provisional estimate of the amount required to defray the expenses of the city and county administration for the coming year. This estimate is forwarded to the board of aldermen and published in the *City Record* (the official paper of the city). The board of aldermen returns the estimate with any suggestions for amendment, and tax-payers have also a right to appeal and urge amendments. The board of estimate and apportionment then makes a final estimate, which constitutes the legal appropriation of the money.

The judicial branch comprises: The Court of Common Pleas, the Superior Court, the City Court, formerly

known as the Marine Court, eleven District Courts, the Surrogate's Court, the Court of Arbitration of the Chamber of Commerce, the Court of Oyer and Terminer, the Court of General Sessions of the Peace, the Court of Special Sessions of the Peace, and six Police Courts. The City Court has jurisdiction only in cases where the amount to be recovered does not exceed \$2,000. The District Courts are limited to cases involving not more than \$250. Besides these, terms of the United States Circuit and District Courts and of the Supreme Court of the State of New York are held within the city.

The officers of the county of New York (Manhattan Island) are the county clerk, salary \$3,000; the register, paid by fees; the surrogate, salary \$12,000; four coroners, salary \$5,000; and the sheriff, who is paid by fees. All are elective offices. The district attorney receives a salary of \$12,000; the commissioner of jurors, \$5,000; three members of the civil service advisory board, \$1,000 each. The mayor, comptroller, recorder, chamberlain, and chairman of the finance committee of the board of aldermen constitute the board of commissioners of the sinking fund for the redemption of the city debt. The board of education is composed of twenty-one commissioners, holding office for three years, of whom seven are appointed by the mayor annually. The board of commissioners of emigration consists of six members appointed by the governor of the State, and the mayor, the president of the Irish Emigrant Society, and the president of the German society. Nine wardens of the port are appointed by the governor to survey damaged vessels or cargoes, supervise the sales of sea damaged goods, and otherwise act in the interest of all concerned in cases of sea damage. The board of pilot commissioners consists of five members, three elected by the Chamber of Commerce, and two by the presidents and vice-presidents of the various marine insurance companies of the city.

The appropriation for municipal and county expenses for 1890 is as follows: Mayoralty, \$26,000; common council, \$76,800; finance department, \$284,500; State taxes, \$4,519,641; interest on city debt, \$5,305,819; redemption of principal of city debt, \$1,080,617; rent of armories and drill rooms, \$50,250; rents, \$130,572; judgments, \$150,000; law department, \$199,200; department of public works, \$3,216,215; department of public parks, \$1,120,700; department of public charities and correction, \$1,949,100; health department, \$392,200; police department, \$4,647,791; department of street cleaning, \$1,255,835; fire department, \$2,138,543; department of taxes and assessments, \$118,800; board of education, \$4,224,417; college of the city of New York, \$147,000; normal college, \$125,000; advertising, printing, stationery, etc., \$246,700; municipal service examining board, \$25,000; coroners' salaries and expenses, \$53,855; commissioners of accounts, \$27,500; sheriff, \$65,700; register, \$125,650; bureau of elections, \$315,119; preservation of public records, \$49,200; miscellaneous, \$209,072; fund for street and park openings, \$204,247; salaries, city courts, \$382,900; salaries, judiciary, \$1,068,840; charitable institutions, \$1,215,311; total, \$35,148,097. The total receipts by the comptroller during 1889 were \$69,876,324.04, of which \$32,735,493.78 was from taxes. The total payments during 1889 were \$70,069,729.16. The total funded debt of the city December 31, 1889, was \$141,839,028.01, from which should be deducted the amount (investments and cash) held by the commissioners of the sinking fund, \$45,638,142.65, leaving the net debt \$96,200,885.36.

The city sends eight congressmen to the national house of representatives and twenty-four assemblymen and eight senators to the State legislature at Albany.

NEW ZEALAND consists of two large islands, the North Island and the South Island, of another much smaller one named Stewart Island, and of islets around the coast. The colony includes also the Chatham Islands and the Auckland Islands. The area of the North Island is about 44,000 square miles, or 28,000,000 acres; that of the South Island is about 55,000 square miles, or 36,000,000 acres; and Stewart Island has about 800 square miles, or 512,000 acres. The Chatham Islands and the Auckland Islands are of inconsiderable dimensions.

The mountains in the North Island occupy about one-tenth of the surface, and are covered with dense forests containing an almost inexhaustible supply of fine timber. In the northern half the mountains are not so frequent as in other parts, and do not exceed 1,500 feet in height. In the center there are some higher volcanic mountains; Tongariro (6,500 feet), occasionally active, Ruapehu (9,100 feet) and Mount Egmont (8,300 feet), extinct volcanoes. The main range of the island, beginning to the eastward of these mountains, is at its greatest height 6,000 feet. The plains in the North Island lie chiefly on the western side of the range. Mount Egmont is surrounded by an extensive and fertile district. Nearly four-fifths of the South Island is occupied by mountains. The greater part of them is open, well grassed, and adapted for pasture. The Southern Alps, as they are called, run close to the west coast the whole length of the island. Mount Cook, the highest peak, is 12,349 feet high, and has many glaciers. Extensive agricultural plains lie on the eastern side. The rugged western slopes are rich in mineral wealth.

There are countless running streams of the purest water throughout New Zealand, but not many rivers of depth and size. The Waikato is the chief river in the North Island. The Wairoa, discharging itself into Kaipara harbor, is large and deep, and is navigable for vessels of considerable tonnage. In the South Island, the chief river is the Clutha, rising north of Lake Wanaka, and 220 miles in length. It flows into the sea about fifty miles south of Otago Harbor.

The lakes in New Zealand are a characteristic feature. Lake Taupo, in the central part of the North Island, covers an area of about 250 square miles. In the South Island there are numerous lakes, some of them of considerable extent, Lake Wakatipu covering 112 and Lake Te Anau 132 square miles.

The coast-line is over 3,000 miles. Cook Strait separates the two large islands, and Foveaux Strait separates the South Island from Stewart Island. A great number of natural harbors are included between the North Cape and Cape Colville. The harbors on the west coast of the North Island have shifting bars at the entrance; but Manukau, Kaipara, and Hokianga are excellently surveyed, and can, with due caution, be safely entered. Inside they are spacious and fine. Auckland and Wellington have excellent natural harbors. The South Island on its north side, from Cape Farewell to Cape Campbell, is indented with numerous good harbors; and on the eastern coast, Port Lyttleton, Akaroa, Port Chalmers, and the Bluff are all available for large vessels. Stewart Island is only 120 miles in circumference, and has several excellent harbors on its eastern side.

Meteorological statistics are collected at Auckland, Wellington, Christchurch, and Dunedin; and observations of rainfall, temperature, and wind-direction are received from thirty other stations.

The mean annual temperature of the North Island is 57° , and of the South Island 52° ; that of London and New York being 51° . The mean annual temperature of the different seasons for the whole colony is in spring 55° , in summer 63° , in autumn 57° , and in winter 48° .

Rain is frequent. In the north the greater fall is during winter; in the south it is more equally distributed throughout the year. There is a much greater rainfall on the west than on the east coast, especially in the South Island.

On the whole, the New Zealand climate is admirably suited to Europeans.

The European population for 1888 was estimated to be 607,380. The native population (Maoris) was estimated at about 46,969 in addition, chiefly in the Northern Island.

The principal quartz-mines for gold are in the Thames and Coromandel districts, near Auckland, in the North Island, but several auriferous reefs are extensively worked in the Otago, Westland, and Nelson gold-fields in the South Island. Alluvial gold mining chiefly exists in the Otago, Westland, and Nelson districts. Gold drift, as it is called, is found in river-beds and on the seacoast, where it can be worked with comparative ease, and also in thick deposits of gravel, the working of which requires mechanical water-power, and often large expenditure. The total quantity of gold produced in and exported from New Zealand from April 1, 1857, to March 31, 1883, was 10,144,926 ounces, valued at \$195,000,000. The quantity during the year ended March 31, 1883, was 248,862 ounces, valued at \$4,900,000. Good coal is obtained in many parts of New Zealand. The number of coal-mines in work in 1882 was 104; and the output during 1882 was 378,172 tons, being 215,954 tons more than the output in 1878. Silver is chiefly extracted from the gold produced in the Thames district, but other mines containing silver ores have been found. There are many other valuable ores—copper, iron, lead, zinc, antimony, chrome, and manganese—some of which are being worked. Several fine mineral oils also are obtained. Building-stones of various kinds and of excellent quality abound. Marble and cement stones occur in many places.

"In the whole colony there are about 12,000,000 acres of land fitted for agriculture, and about 50,000,000 which are better adapted for pasturage; but from these estimates allowance must be made for about 20,000,000 of surface at present covered by forest."

New Zealand is singular in the absence of all indigenous land mammals except two small kinds of bat. There are no snakes. A peculiar species of frog exists, but it is very rare. Insect life is not nearly so abundant as in Europe, though bloodthirsty sandflies swarm on the sea-shore, and mosquitoes in the bush. There are between four and five hundred species of mollusks. Seals are numerous on some parts of the coast. New Zealand is also remarkable for its wingless birds, living and extinct. The discovery and colonization of the country have completely changed the character of its animal life. Captain Cook introduced the English dog and the pig. Colonists have brought all kinds of domestic animals. Game and small birds have been imported and acclimatized; rabbits have become a formidable nuisance in many districts.

There are about one thousand species of flowering plants, of which about three-fourths are endemic. Most of those not peculiar to the country are Australian; others are South-American, European, Antarctic; and some have Polynesian affinities. Ferns and other cryptogamic plants are in great variety and abundance. There are a few indigenous plants and fruits used as food. *Phormium tenax*, or the New Zealand hemp, is a common and most useful plant. Forests covering from 11,000,000 to 12,000,000 acres are a characteristic feature in New Zealand vegetation. Much of the timber is of great value for building and for constructive works. The area of forest-land is rapidly diminishing,

and the rate of decrease in some large forests has been estimated at 4 per cent. per annum. The rapid decrease is stated to be due to reckless and wasteful consumption of the best timber without regard to the conservation of the young trees, to fires, and to other avoidable causes.

The principal crops of New Zealand are those indigenous to the temperate zone. In 1883, there were 27,352 holdings; 738,822 acres cultivated to grain; 394,473 acres to green and other crops, excluding grasses, and 4,517,960 acres to other kinds of crop, including sown grasses, and of land broken up but not under crop.

Except eels and a few small fishes of little worth, there are no indigenous fish in the rivers.

The natural features of the country were, for a long time after its colonization, a bar to overland internal communication, but in March, 1889, there were 1,777 miles of government railway lines in working order, and 163 miles more under construction; and the colony possessed in addition 88 miles of private lines, together with an excellent coaching system.

The value of the principal articles of export for the year 1888 was as follows: Wool, \$15,100,000; frozen meat, \$3,100,000; produce, \$5,400,000; gold, \$4,500,000, and of miscellaneous, \$3,400,000.

The total shipping inward during 1888 was 683 vessels of 526,435 tons, as compared with 765 vessels of 420,134 tons during 1881. The total outward during 1888 was 701 vessels (531,478 tons).

Tasman discovered New Zealand in 1642, and in 1769 Captain Cook took possession of the country for George III. The first settlement of Europeans was made in 1814, but no colonization took place until 1839, and in 1841 New Zealand was, by letters patent, erected into a separate colony distinct from New South Wales.

The general government consists of a governor, aided by a ministry, a legislative council appointed by the crown for life, at present consisting of forty-five members, and a house of representatives, to be reduced to seventy-five, elected for three years, four members of which are Maoris elected by the natives. Its seat is at Wellington. Local administration is vested in local elective bodies, such as municipal councils, county boards, road boards, and others, with power to levy rates. The colonial revenue is chiefly derived from customs, stamp duties, property tax, postal and telegraphic services, railways, and crown land sales. The proceeds of land sales are applied to surveys and public works. Crown lands are acquired at auction, or by selection, or on deferred payment, or by lease with right to purchase on certain conditions. The price is rarely less than \$5 an acre.

The system of education is free, secular and compulsory. There are 1,128 district schools with 2,839 teachers and 116,283 scholars, also 299 private schools with 13,853 scholars, in addition to 67 village schools for Maoris. The higher education of boys and girls in the cities and large towns is carried on in 23 endowed colleges and grammar schools, degrees being conferred by the university of New Zealand. Exclusive of the aboriginal population, the estimated population of New Zealand on December 31, 1883, was 515,000.

It has always been difficult to collect the number of the aboriginal population. In 1878 the number returned was 43,595; in 1881, 44,097, of whom 19,729 were females. Those residing in the North Island were 22,872 males, and 18,729 females. The apparent increase in 1881 is believed by the registrar-general to be attributable to omissions in 1878. His conclusion is that on the whole there was a decrease from 1878 to 1881. If former estimates, partly conjectural, are at

all correct, the decrease during the last forty years has been considerable. The comparatively small proportion of females under fifteen years of age to the total population of both sexes in 1881, given as 15.35 per cent., renders future increase improbable.

The estimated population of its chief cities and towns in January, 1888, was as follows: Wellington and suburbs, 30,000; Auckland and suburbs, 59,600; Dunedin and suburbs, 47,800; Christchurch and suburbs, 46,600; Nelson, 7,660; Oamaru, 5,300; and Napier, 8,400.

The Maoris, before their conversion, had no idea of a Supreme Being. Their notion was that all things had been produced by process of generation from darkness and nothingness. They believed that the spirit survives the body, and retires to some place under the earth, whence it occasionally returns to advise and sometimes punish the living. The Maoris are divided into tribes, which respectively had their chiefs and priests. Land was held by tribal tenure, and small plots were cultivated. Each tribe had its unwritten laws regarding land, cultivation, and other social matters. "Tapu," or the practice of making certain things sacred—a rule, the breach of which was severely punished by spirits and men—was an essential element in their code of law. Tribes were constantly fighting with each other, and the chief causes of strife arose from alleged wrongs to property and person. Cannibalism was practiced from vindictive feelings. Slaves were captives in war. The dead bodies of chiefs were put away on stages; and in course of time the bones were collected and hidden in secret places. The Maoris have a genius for war, and show great ability in building, fortifying, and defending stockades.

The Maori language is a Polynesian dialect. It closely approaches that of the Sandwich Islands, of the Navigators' group, and of Rarotonga. Natives of these mutually understand each other.

In 1814 the Rev. Samuel Marsden, colonial chaplain to the government of New South Wales, first established his church mission in New Zealand at the Bay of Islands. He was followed by others; and both Protestant and Roman Catholic missions were formed. In the course of the following thirty years almost the whole native population was converted, nominally, at least, to Christianity. There was in after years a considerable relapse; but the results of missionary teaching were, as a whole, great and permanent. Cannibalism ceased, and the barbarous nature of the race became softened and capable of civilization. The missionary paved the way for the colonist.

NEY, MICHEL, marshal of France, was born at Saarlouis on January 10, 1769, and in 1787 went to Metz and enlisted in a regiment of hussars. But for the Revolution he could never have become more than a sergeant, but in the new state of things he was elected lieutenant, and afterward (1792) captain of his regiment. He was aide-de-camp to General Lamarque in March, 1793, and soon after became lieutenant-colonel, when Kléber perceived his eminent military ability, and made him adjutant-general in August, 1794. He was promoted colonel in September, and in February, 1795, might have become general of brigade, but modestly refused the rank, alleging his own unworthiness. He commanded the advanced guard of Kléber at the battle of Altenkirchen, and was made general of brigade on the field of Forchheim. He then commanded the right wing of Hoche's army, and in 1798 took Mannheim. Sent next to Switzerland, he there reorganized Masséna's cavalry, and distinguished himself in Masséna's great campaign, in which he was three times wounded, and after which he was made general of division. In 1799 he com-

manded on the Rhine, and by his skillful operations obtained the armistice during which the *coup d'état* of Brumaire took place. In 1801 he was present at Hohenlinden, and in May, 1802, he married Mademoiselle Auguié, whom Josephine had chosen for him at Bonaparte's request. He became inspector-general of cavalry, and, after a short residence as minister in Switzerland, commandant of the camp of Montreuil. It was while there that in the name of the army he begged Napoleon to declare himself emperor, and on the establishment of the empire he was made marshal of France and grand cross of the Legion of Honor. In 1805 he commanded the sixth corps of the grand army, and by his victory at Elchingen, for which he was made duke of Elchingen, secured the surrender of General Mack at Ulm. He was then ordered to the upper Adige, and was present at Jena and Eylau, and was so instrumental in winning the battle of Friedland that Napoleon called him the *brave des braves*, and gave him the grand eagle of the Legion of Honor. In 1808 he was ordered to Spain with the sixth corps, and received the command of Galicia, which he managed to keep in subjection to the French in spite of the mountainous nature of the country. In 1810, in command of a *corps d'armée* under Masséna, he advanced into Portugal. For his opposition to Masséna Ney was recalled from Spain, but received the command of the third corps in the grand army of 1812. At the battle of the Moskva he so distinguished himself that he was made Prince de la Moskowa on the field, and in the disastrous retreat from Moscow it was Ney who commanded the rear-guard, and kept the relics of the grand army together. He served at Lützen and Leipsic, and in the last defensive campaign of 1814, and with Macdonald remained faithful to Napoleon to the last. At the Restoration he was made a peer, and in 1815 was given the command of the army sent to check Napoleon on escaping from Elba. But the sight of the old colors and his old master was too much for him, and he led his troops over to Napoleon's side. In the Flemish campaign he fought the battle of Quatre Bras against the English on the same day that Napoleon defeated the Prussians at Ligny, and at Waterloo he commanded in person the last charge of the Old Guard. He made no attempt to leave France, and was arrested as a traitor; on December 5th he was found guilty of high treason by the House of Peers by 169 votes to 17, and two days later he was shot in the gardens of the Luxembourg.

NIAGARA, a river in North America forming a portion of the great lake and river system known as the ST. LAWRENCE (*q. v.*), flows northward from Lake Erie (573 feet above sea-level) to Lake Ontario, separating the State of New York from the province of Ontario, in Canada, and with the thirty-three miles of its course makes a total descent of 328 feet. On issuing from Lake Erie the river is only about three-fourths of a mile broad, and for the first two miles is somewhat swift; it then divides and passes around Grand Island, broadens and assumes the tranquility of a lake until the commencement of the rapids, where it suddenly narrows and makes a descent of about fifty-two feet in the mile before its hurried and troubled waters are precipitated over a lofty chasm forming falls of unexampled grandeur. The breadth of the river immediately before making the leap is 4,750 feet, but the center is occupied by Goat Island, rising about forty feet above the water, and occupying a breadth of about 1,000 feet, a distance of about 1,400 feet separating it from the American side and about double that distance from the Canadian side, while the length of the verge line between the island and the Canadian side is moreover increased by an inward horseshoe curve. The height of the fall on

the American side is about 164 feet, and on the Canadian side about 150 feet; the discharge is about 18,000,000 cubic feet per minute. The waters plunge into an abyss about 1,000 feet wide, and during the next seven miles make a descent of about 104 feet through a deep ravine with perpendicular banks rising to a height of from 200 to 350 feet, the breadth of the river varying from 250 to 400 yards. Three miles below the great falls the whirlpool rapids are formed by a sudden turn in the channel causing the waters to impinge against the Canadian shore, where they have made a deep indentation, and to rush back to the American side in a great whirl or eddy, rendered more furious by the uneven bed of the river, and the narrow space into which it contracts. After issuing from the gorge at Lewiston, the river enters on a tranquil course, which continues to Lake Ontario. The point where the gorge ceases marks the termination of a table-land in an escarpment facing northward; and it has been generally held that the falls were situated here at the time when the river first began to flow, that is, subsequently to the great Ice Age. Recent study has suggested a much more complicated theory, making a great part of the gorge older than the Ice Age, and thus reducing the period for which the modern river has flowed from several hundred thousands of years to one-tenth of that time. The rate of recession is very uncertain; while it would appear from the best maps that some parts have receded at least 100 feet since 1841, others have remained more or less stationary. At the present site of the falls the edge of the cataract is formed by strata of hard limestone reaching to a depth of about eighty feet; and by the action of the spray the softer shaly strata below have been hollowed out so as to form the "Cave of Winds," which may be entered from the Canadian side. The river is crossed by a suspension bridge for foot passengers, about 250 yards below the falls, and a mile and a half farther down by two railway bridges about 100 yards apart—one of which has a carriage-way eighteen feet below; the other, a cantilever bridge, completed in December, 1883, carries a double line of rails.

The name Niagara ("thunder of waters") is the invention of an Indian tribe who adopted it as their own designation, from the fact that it was descriptive of the remarkable natural phenomenon situated within their territory. This tribe, on account of their peaceful proclivities, were also called the Nenter Nation; but, to avoid the fury of the Iroquois, they finally joined them in 1723 against the Hurons, and from this time they ceased to exist as a separate tribe. The first printed allusion to the cataract is in the record of a voyage by Jacques Cartier in 1535. Its position was first mentioned by Samuel Champlain in a map attached to his voyages published in 1613. The earliest description is that by Father Hennepin, who visited it in 1678, and published an account of it accompanied with a sketch giving a view of a third fall on the north side caused by the presence of a large rock on Table Rock. The rock and cascade are mentioned by Kalm, the Swedish naturalist, who visited Niagara in 1750, but they had disappeared a few years previously. Some writers, indeed, mention as many as six falls, and there can at least be no doubt that within the last 200 years the aspect of the falls has been greatly altered. Goat Island extended, up to a comparatively recent period, for about another half mile northerly in a triangular prolongation; and the number of small islands was perhaps larger than at present. Large masses fell in 1818, 1828, 1843, and 1847, and in June, 1850, Table Rock disappeared.

NIAGARA FALLS, a village of Niagara county, N. Y., situated at the Niagara falls, opposite Drummondville (on the Canadian side), and a mile and a half

above the contiguous village of Suspension Bridge, formerly Niagara City, which is connected by a suspension bridge with Clifton (on the Canadian side). Population, 5,000.

NIAM-NIAM, a numerous and widespread Central African race, who were first visited by John Petherick in 1858, and have since been more fully described, especially by Piaggia, Doctor Schweinfurth, Dr. W. Junker, Potagos, and G. Casati. But none of these explorers have penetrated more than a few miles from the upper Nile and Welle basins into the Niam-Niam domain, which consequently still remains for the most part an unknown land.

NIAS ISLAND. See **SUMATRA**.

NIBELUNGENLIED, or **NIBELUNGE NÔT**, a great epic poem written in a Middle High German dialect. The story told in this poem belonged in its primitive form to the whole Teutonic race, and was composed originally of purely mythological elements.

NICÆA, or **NICE**, still called **ISNIK**, was an important town of Asia Minor, in Bithynia, on the lake Ascania. Antigonus built the city on an old deserted site, and soon afterward Lysimachus changed its name from Antigonía to Nicæa, calling it after his wife. Under the Roman empire Nicæa and Nicomedia disputed the title of metropolis of Bithynia. On the council held there in 325 A.D. see **CREEDS** and **COUNCIL**. The possession of the city was long disputed between the Greeks and Turks. It remained an important city for some time after its final incorporation in the Ottoman empire, but has decayed till it is now a poor and insignificant village.

NICANDER, a Greek poet, physician and grammarian, succeeded his father Damnaeus or Xenophanes as hereditary priest of Apollo at Clarus, the famous temple in the territory of the Colophonians. Hence he is often called Colophonius. He wrote a great number of works both in prose and verse, of which two are preserved.

NICARAGUA, one of the five states of Central America, forms an irregular equilateral triangle wedged in between Honduras and Costa Rica north and south, with base stretching for 280 miles along the Caribbean Sea from Cape Gracias à Dios southward to the San Juan delta, and apex at the Coseguina volcano, Gulf of Fonseca, which separates it on the Pacific side from San Salvador. The frontier toward Honduras, as laid down by the treaty of 1870, runs from the Gulf of Fonseca in a northwesterly direction along the Cordillera de Dipilto to 85° W., and thence a little north of and nearly parallel with the Rio Coco (Wanks) to the Atlantic above Cape Gracias à Dios. The Costa Rica frontier may be taken as practically defined by the course of the San Juan river and the south side of Lake Nicaragua to within fourteen miles of the Pacific, where it is marked by a conventional line drawn across the isthmus from the mouth of the Sapoá river to Salinas Bay on the Pacific. Within these limits, and including the Reserva Mosquita (Mosquito territory), the state comprises a total area of 58,000 square miles, with a population usually estimated at 400,000, but by the census of 1882 reduced to 275,816, and distributed over ten departments.

The low, monotonous, and swampy Mosquito Coast is broken by the two lagoons of Pearl Cay and Bluefields, and is fringed by a few cays (islets) and reefs, such as Great and Little Corn, Longreef, and Tangweera, which shelter no harbors, and serve only to obstruct the navigation. Here the only port is Grey Town (San Juan del Norte), formed by the northern branch of the San Juan delta, and now nearly choked with sand. But the bold and rocky west coast, which extends for about 200

miles from Coseguina Point to Salinas Bay, although destitute of islands, presents a few convenient harbors, of which the chief are San Juan del Sur, Brito, and especially Realejo.

In Nicaragua the great geographical feature is the remarkable depression stretching for about 300 miles northwest and southeast parallel with the Pacific coast, and transversely to the Central American plateau, which it almost completely interrupts. This depression, which lies at a mean elevation of scarcely 100 feet above the sea, is now flooded by the two great lakes Managua and Nicaragua (Cocibolca), which collect nearly all the drainage of the western provinces, discharging it through the desaguadero (outlet) of the Rio San Juan to the Atlantic. About midway between Lake Nicaragua and the Caribbean Sea, the San Juan entirely pierces the main chain of the Cordillera de los Andes, which here sweeps around the east side of the lacustrine basin at a mean height of 4,000 or 5,000 feet northward to the Honduras highlands. Toward the lakes the descent is very precipitous; but on the opposite side the land falls in broad terraced plateaus down to the Mosquito coast.

Throughout its entire length the depression is traversed by a remarkable volcanic chain of isolated cones, which north of the lakes takes the name of the Maribios, terminating in the extreme northwest with Coseguina (4,000 feet), and in the extreme southeast with the low wooded archipelagos of Solentiname and Chichicaste near the head of the desaguadero. Between these two extremes the chief cones, proceeding southward, are—the Maribios chain, comprising El Viejo (6,000 feet), Santa Clara, Telica, Orotá, Las Pilas, Axosco, Momotombo (7,000 feet, highest point in the State); Masaya or Popocatepec and Mombacho (5,700 feet), near Granada; lastly, in Lake Nicaragua the two islands of Zapatera and Ometepe with the twin peaks Ometepe (4,100 feet) and Madera (4,190 feet). Several of these are still active, or at least quiescent, and in 1835 Coseguina was the scene of one of the most tremendous eruptions on record. The outbreak lasted four days, during which sand fell in Jamaica, Mexico, and Bogota. After a long repose Ometepe also burst into renewed activity on June 19, 1883, when the lavas from a new crater began to overflow, and continued for seven days to spread in various directions over the whole island.

No rivers of any size flow westward to the Pacific, the western provinces discharging, as already stated, mainly through the San Juan emissary to the Caribbean Sea. Yet Lake Managua, which lies sixteen feet above Lake Nicaragua, and 150 above sea-level, may now be regarded almost as a land-locked basin. Although nearly fifty miles long by twenty-five broad, with a mean depth of thirty feet, it seldom sends any overflow through the natural outlet of the Estero Panaloya (Tipitapa) down to the lower basin. It does not appear to have undergone any perceptible change of level since the conquest; but some of its former feeders have probably been displaced by the violent earthquakes, of which this region is a chief center. But the larger lake continues to receive the important Rio Frio from Costa Rica at its southeastern extremity, besides numerous perennial streams, especially from the western slopes of the Cordillera de los Andes. Hence there is an abundant discharge through the Rio San Juan, a deep, sluggish stream 128 miles long, from 100 to 400 yards broad, ten to twenty feet deep, but unfortunately obstructed by five dangerous rapids presenting serious obstacles to steam navigation. The lake itself is the largest freshwater basin between Michigan and Titicaca, being nearly 100 miles long by 40 broad and 240 feet deep in some places, but shoaling considerably, especially toward the outlet, where it falls six to

eight feet. Under the influence of the intermittent trade winds it rises and falls regularly toward the south side, whence the popular notion that it was a tidal lake. It is also exposed to the dangerous Papagayos tornadoes, caused by the prevailing northeasterly winds meeting opposite currents from the Pacific.

NICASTRO, an episcopal city of Italy, in the province of Catanzaro, sixteen miles west of Catanzaro and about six miles from the Gulf of Sta. Eufemia. There are two large suburbs—Zangaroma, founded by an Albanian settlement in the fifteenth century, and Bella, dating from 1782—and the communal population is 14,067.

NICCOLO PISANO. See PISANO.

NICE, a city of France, the chief town of the department of Alpes Maritimes, and previous to 1860 the capital of the countship of Nice (Aizza), in the kingdom of Sardinia, occupies a fine position at the mouth of the Paillon (Paglione), a stream (often dried up in summer) which, after a course of twenty miles, enters the northern end of the Baie des Anges. A steep, isolated limestone hill, 315 feet in height, running back for some distance from the shore, forms the historical nucleus of the town. Formerly crowned by a castle, which, previous to its destruction by the duke of Berwick in 1706, was one of the strongest fortresses on the coast, it is now laid out as a public pleasure ground, and planted with aloe, cactus, agave, and palm. Toward its southwest corner stands a tower (Tour Bellanda or Clérissy) dating, it is believed, from the fifth century. The old town stretches along the western base of the hill; the "town of the eighteenth century" occupies the ground farther west which slopes gently toward the Paillon; and away to the northeast and northwest beyond the stream lie the ever-growing quarters of the modern city. The whole frontage of Nice is composed of fine embankments; the Quai des Ponchettes, constructed in 1770 around the base of the castle hill, is continued westward by the Quai du Midi as far as the Pont des Anges, which crosses the mouth of Paillon; and from the public gardens and the municipal casino on the other side of the stream the Promenade des Anglais, a boulevard eighty-five feet wide, extends for more than a mile to the mouth of the Magnan, and is likely to be prolonged to the Var. The course of the Paillon also is embanked on both sides, and at one part the Place Masséna, one of the largest public squares in the city, and the principal resort of foreign visitors, has been laid out across the stream. Besides a Roman Catholic cathedral—St. Réparate, dating from 1650—Nice possesses a Russian church, two synagogues, and several Protestant chapels. Architecturally the most remarkable church is Notre Dame, a modern Gothic building with two towers 213 feet high, erected by the town in 1835 to commemorate its preservation from cholera. The secular buildings include the town-house, the prefecture, the theaters, the hospitals, the lycée (founded by the Jesuits in the seventeenth century), the natural history museum, the library (especially rich in theology), and, at some distance from the town, the astronomical and meteorological observatory on Mount Gros. The industrial establishments comprise perfume factories, distilleries, oilworks, furniture and woodwork factories, confectionery-works, soapworks, tanneries, and a national tobacco factory, employing several hundred persons. In 1881 the population of the city was 54,953, and of the commune 66,279. During winter there is a large proportion of strangers from all parts of the world.

Protected toward the north by hills which rise stage behind stage to the main ridge of the Alps, Nice is celebrated for the mildness of its climate. The mean temperature is 60° Fahr., that of winter being 49°, of spring 56°, of summer 72°, and of autumn 63°. For

a few nights in winter the mercury sinks below freezing point, but snow is practically unknown, falling, on an average, only half a day in the year. The highest reading of the thermometer is rarely above 90°. For two thousand years the climate of Nice has been considered favorable in chest complaints. Those who are requiring rest, and those suffering from gout, asthma, catarrhs, rachitic affections, scrofula, stone, also experience benefit; but the reverse is the case when heart disease, nervous disorders, or ophthalmia are concerned. Autumn is the best season; in spring the sudden changes of temperature demand great care. Means of passing the time pleasantly are fairly abundant. The city is at its liveliest during the carnival festivities, in which, as at Rome, battles are waged with "confetti," and flowers.

NICEPHORUS I., emperor of Constantinople from 802 to 811, born at Seleucia in Pisidia, is alleged, on very doubtful authority, to have been a descendant of Jaballah, who had been monarch of the very small Arabian kingdom of Ghassán in the time of Heraclius, and for a time had professed the Mohammedan religion. In the reign of Irene he rose to the office of logothetes, or lord high treasurer, and in 802 he was joined by her favorite eunuchs in a plot by which she was dethroned and exiled, while he himself assumed the crown (October 31). Nicephorus in person took the field against Haroun al-Rashid, but sustained a great defeat at Crasus, in Phrygia; and subsequent inroads of his conquerors compelled him to sue for peace, which was granted only on condition of an annual tribute of 30,000 pieces of gold, besides three additional pieces (perhaps, as Finlay suggests, medallions of superior size) for himself, and three for his son Stauracius. By the death of Haroun in 809 Nicephorus was left free to turn his attention to the Bulgarians, whose warlike king, Crumm, had begun to harass the empire in the north; but six days after it had crossed the frontier the powerful Byzantine army was attacked in force by night, and Nicephorus, along with six patricians, many officers of high military rank, and a large number of rank and file, was put to the sword.

NICEPHORUS II. (Phocas), emperor of Constantinople from 963 to 969, was member of a brave Capadocian family which had previously furnished more than one distinguished general to the empire. He was born about 912, joined the army at an early age, and under Constantine VII., Porphyrogenitus, attained the high rank of magnus domesticus, or general of the East (954). In the almost continual struggle with the Saracens which this post implied he sustained severe defeat in 956, but retrieved his fame in 958 and again in 959 in Syria; and in July, 960, he led the expedition against Crete which compelled Candia to surrender after a siege of ten months, and again brought the whole island under Byzantine rule. The long extinct honors of a triumph were revived to reward him on his return to Constantinople. In 962 he again set out with a large army against Syria; after forcing his way through the narrow passes of Mount Amanus, and compelling the principal cities to open their gates, he was pushing on toward the Euphrates when intelligence reached him in 963 that the emperor Romanus II. had died, leaving the empress Theophano regent for her infant sons. He returned to Constantinople, with the help of the patriarch, procured for himself the supreme command of the army during the minority of the princes, and, after gaining over the officers and soldiers to his interest, consented to allow himself to be proclaimed emperor. He was crowned on August 16th. In 964 he resumed the war against the Saracens, and, though compelled to raise the siege of Tarsus, was successful in capturing Adana and Mopsuestia; in the following year Tarsus

also was forced to surrender to himself, while Cyprus was reconquered for him by the patrician Nicetas. In 966 and 967 the internal affairs of the empire and threatening trouble in Hungary and Bulgaria detained him in Constantinople; but the spring of 968 saw him once more in the field against the caliph, and Laodicea, Hierapolis, Aleppo, Arca, and Emesa were added to his conquests. In the following year Antioch also fell, in the emperor's absence, into the hands of the patricians Burtzes and Peter, but Nicetas was less successful against Sicily. Meanwhile Nicephorus had not made himself so popular on the throne as in the camp. He was assassinated in his sleeping apartment on the night of December 10, 969. At the head of the conspirators was his nephew, John Zimisce, who succeeded him.

NICEPHORUS III. (Botaniates), emperor of Constantinople from 1078 to 1081, belonged to a family which claimed descent from the Roman Fabii. He served in the army, and rose to be commander of the forces in Asia. In 1078 he assumed the purple at Nicæa, almost simultaneously with Nicephorus Bryennius (father or uncle of the historian of that name), who had revolted against Michael VII. at Adrianople; the aristocracy and clergy of the capital supported the claims of Botaniates, who was crowned on March 25, 1078. On April 1, 1081, Nicephorus was forced to abdicate and become a monk of St. Basil.

NICEPHORUS BRYENNIUS. See **BYZANTINE HISTORIANS.**

NICEPHORUS, surnamed **CALLISTI**, the last of the Greek ecclesiastical historians, lived at Constantinople, perhaps as a monk in connection with the church of St. Sophia. He was born about the close of the thirteenth century, and died not later than 1356.

NICEPHORUS GREGORAS. See **BYZANTINE HISTORIANS.**

NICEPHORUS, a Byzantine historian, surnamed **PATRIARCHA**, was patriarch of Constantinople from 806 to 815.

NICHOLAS, St., of Myra, according to the Roman breviary (December 6th) was a native of Patara in Lycia, and was given to his parents in answer to their prayers. From his earliest infancy he signally displayed the piety for which his whole life was remarkable, on Wednesdays and Fridays regularly refusing to receive nourishment from his nurse except once only, and that after sunset. Having given himself wholly to God, Nicholas made a pilgrimage to Palestine, and in his voyaging miraculously stilled a storm by his prayers. On his return to his native province he visited Myra, the capital, where, as it fell out, the bishop had just died, and the chapter had been divinely advised to select as his successor a man named Nicholas who should be the first to enter the church next morning. Nicholas, thus plainly indicated, was duly consecrated, and displayed throughout his whole term of office every episcopal virtue. Under Maximian and Diocletian he was seized for his constancy, removed far from his diocese, and thrown into prison, where he lay until the days of Constantine, when he returned to Myra. He afterward attended the council of Nice, and died a natural death not long after his return. His remains were subsequently removed to Bari (Barium), in Apulia. Nicholas is not mentioned among the Nicene fathers by any of the church historians of that or the succeeding century, and the earliest extant trace of his existence is in the fact that a church was dedicated to him in Constantinople by Justinian, about the year 560. Before the twelfth century his name had become very prominent both in the Eastern and in the Western Church, it is difficult to tell precisely why; and to this day he is one of the most popular saints in the orthodox Greek communion.

NICHOLAS I., sometimes called **The Great**, and certainly the most commanding figure in the series of popes between Gregory I. and Gregory VII., succeeded Benedict III. in April, 858. According to the annalist, "he owed his election less to the choice of the clergy than to the presence and favor of the emperor Louis II. and his nobles"—who can hardly have foreseen with what ability and persistency the rights of the holy see as supreme arbiter of Christendom were to be asserted even against themselves by the man of their choice. Of the previous history of Nicholas nothing is recorded. His pontificate of nine years and a half was marked by at least three memorable contests which have left their mark in history. The first was that in which he supported the claims of the unjustly degraded patriarch of Constantinople, Ignatius. The second great struggle was that with Lothaire, the king of Lorraine (second son of the emperor Lothaire I., and brother of the emperor Louis II.), about the divorce of his wife Theutberga or Thietberga. The third great ecclesiastical cause which marks this pontificate was that in which the indefeasible right of bishops to appeal to Rome against their metropolitans was successfully maintained in the case of Rothad of Soissons, who had been deposed by Hincmar of Rheims. He died on November 13, 867, and was succeeded by Hadrian II.

NICHOLAS II., a Burgundian, whose Christian name was Gerard, was archbishop of Florence when he was chosen (December 28, 1058) at that place to succeed Stephen IX. in the papal chair. Some time previously the old Roman feudatory barons had caused to be consecrated, under the name of Benedict X., John, cardinal bishop of Velletri, who, however, was speedily deposed. The election of Nicholas had been brought about by Hildebrand (afterward Gregory VII.), and his whole pontificate derived its character from that master-spirit. Its first act of historical importance was the framing by the second Lateran council (April, 1059) of the decree which vested the election of popes in the cardinal bishops in the first instance, the assent of the cardinal priests and deacons being next required, then that of the laity, and finally that of the emperor. In the following June Nicholas visited Apuli, accepted the submission of the Normans, and removed the ban of excommunication, investing Richard in the principality of Capua, and Robert Guiscard in the dukedom of Apulia, Calabria, and Sicily. He died at Florence in June, 1061, and was succeeded by Alexander II.

NICHOLAS III. (Giovanni Gaetano), a member of the noble house of Orsini, succeeded John XXI. as pope on November 25, 1277. In 1278 he extorted from the newly-elected and insecurely-seated Rudolph of Hapsburg an absolute cession of the Romagna and of the exarchate of Ravenna, and in the same year he deprived Charles of Anjou of his vicariate of Tuscany. He was planning with Rudolph an entirely new distribution of the thrones of the empire, by which the royal dignity was to be conferred on more than one member of the house of Orsini, when a stroke of apoplexy brought his career to a sudden close on August 22, 1280. The successor of Nicholas III. was Martin IV.

NICHOLAS IV. (Girolamo de Ascoli), pope from February 22, 1288, to April 4, 1292, was born at Ascoli, of humble parentage. At an early age he entered the Franciscan order, of which he rose to be general in 1274, after the death of Bonaventura. It was in this capacity that in 1278 he condemned Roger Bacon to imprisonment on account of his writings. He subsequently became bishop of Præneste, and he was created cardinal by Nicholas III.

NICHOLAS V. (Tommaso Parentucelli), the pope whose name is most intimately connected with the

revival of learning, was the son of a physician, and was born at Sarzana, near Spezzia, in 1389. He received a good education at Bologna, became tutor in the Albizzi and Strozzi families at Florence, and ultimately entered into the service of Albergata, bishop of Bologna. He accompanied his patron to several embassies, and gained so high a reputation for diplomatic ability and for learning that shortly after Albergata's death he himself obtained the see of Bologna, was sent by Eusebius IV. on an embassy into Germany, and in December, 1446, was made a cardinal. In less than three months he was pope in succession to Eugenius. He aimed especially at making Rome architecturally a worthy capital of the Christian world; he repaired its fortifications, began the rebuilding of its cathedral, enlarged and adorned its thoroughfares, and traced much of the plan of restoration executed by his successors. But his great glory was his active coöperation in the revival of learning. Under him the papacy regained much of its former luster, and till late in his reign his administration was disturbed by no unfortunate events. He died on March 24, 1455. He was succeeded by Calixtus III.

NICHOLAS V. (Pietro di Corvara), antipope in Italy from 1328 to 1330, during the pontificate of John XXII. at Avignon, was a native of the Abruzzi and a member of the Franciscan order. He owed his nomination to the papacy, and his election (May 12, 1328) by popular acclamation, to the influence of the excommunicated emperor Louis the German, on whose head he placed the crown after his own enthronement. Carried to Avignon, on making full confession and abjuration of his heresies and impieties (September 6, 1330), he was kept in honorable imprisonment in the papal palace until his death in 1334.

NICHOLAS I., czar of Russia, third son of Paul I., was born at Tsarkoe-Selo on June 25, 1796. His elder brothers were Alexander and Constantine, of whom the former was twenty years his senior. Their father was murdered in 1801, and Alexander then became emperor. The education of Nicholas was conducted under the care of his mother, a pious but narrow-minded woman. He was brought up in retirement, and even during the invasion of Russia by Napoleon in 1812 he was not permitted to serve in the army. His tastes, however, were all military, and his favorite studies mathematics and fortification. During the campaign of 1814 in France he was allowed to come to the allied headquarters, but not to take part in any engagement. He married, in 1817, Louise Charlotte, daughter of Frederick William III., king of Prussia, and this union had for half a century an important effect on the history of Prussia and Germany at large. Alexander having no sons, Constantine was heir to the throne. This brutal and ignorant prince had, however, the sense to recognize his own unfitness for the task of governing an empire, and, by a secret agreement with the reigning sovereign, he renounced his rights in favor of Nicholas. Alexander died on December 1, 1825. Constantine, who was in Poland, showed no inclination to prefer his claims; the edict of the late emperor appointing Nicholas his successor was opened, and the younger brother was called by the highest authorities of Russia to assume the crown. He nevertheless refused, and, as it would seem, in perfect sincerity, until Constantine had formally confirmed his renunciation. The delay led to serious consequences. Conspiracies against the late emperor and in favor of a freer government had been formed in the army and among the nobles; and when the troops at St. Petersburg were called upon to take the oath to Nicholas, revolt broke out. The young czar showed great nerve and courage, but the mutiny was not put down without bloodshed, and the impres-

sion which it left on his mind never passed away. The maintenance of despotic power was a duty to which he devoted himself with the deepest religious conviction. At the accession of Nicholas, Russia had been for some years on the brink of war with the Porte. Greece was in insurrection, and Russia had its own specific causes of complaint in consequence of the alleged infraction of the privileges of the Danubian provinces guaranteed by the treaty of Bucharest.

England and Russia undertook to tender their mediation, requiring the sultan to grant the Greeks a modified independence, and the concert was subsequently joined by France. The result of this combination, and of Ottoman obstinacy, was the destruction of the Turkish fleet at Navarino by the allied squadrons, and the establishment of Greek independence. This, however, did not terminate the contentions between Turkey and Russia. The Porte itself challenged war, and in 1828 hostilities broke out. Nicholas took part in the first and unsuccessful campaign of 1828, but allowed his generals to act by themselves in 1829; and the march of Diebitsch over the Balkans was followed by the peace of Adrianople. A Persian war had already been successfully concluded, and Russia had gained thereby two provinces in the east. The peace of Adrianople gave it only an improved frontier on the eastern shore of the Black Sea. In 1830 the fall of the Bourbons made an end of the friendship which existed between France and Russia, and restored the union between the three despotic courts of St. Petersburg, Vienna, and Berlin, which had been framed in 1814 and interrupted by the course of Eastern affairs. The insurrection of Poland soon followed. Alexander had received the grand-duchy of Warsaw from the congress of Vienna as a separate kingdom, united with Russia only in the person of its ruler; and he had fulfilled his promise of granting it a constitution, and treating it as a distinct nationality. The violation of these rights by the grand-duke Constantine, who was governor of Poland, and the virtual establishment of dictatorial rule, caused the insurrection against Nicholas. The Polish leaders sent their demands to St. Petersburg; Nicholas replied that he would answer them with cannon. The diet now pronounced his dethronement as king of Poland, and the armed struggle began. It was a long and doubtful one, for Poland had a regular army of its own; but the victory was at length won by Nicholas, and he showed no mercy to his conquered enemy. Poland was made a Russian province; its liberties were utterly extinguished; its defenders were sent by thousands to Siberia. During the years that followed, the struggle between the sultan and his vassal, Mehemet Ali, pasha of Egypt, brought the Eastern question again to the front of European affairs. Nicholas watched the events of 1848, and strengthened his army. So long as revolution did not approach his own frontiers he was willing to hold his hand; but when Hungary rose against the Hapsburgs and established its national independence he felt that Poland would soon follow its example, and sent his soldiers to crush the Magyar armies which Austria had not been able to subdue. His aggressions upon the Ottoman empire, continued up to 1853, brought England and France into the field against him. His armies were defeated at Alma and Inkermann, his fortresses besieged; and in the bitterness of defeat death came upon him, February 18, 1855. Shortly before his death he is said to have laid two injunctions upon his son and successor—to liberate the serfs, and never to grant Poland a constitution.

NICHOLAS OF BASEL, generally called by his friends the Great Layman or the Great Friend of God,

was the founder of a singular widespread association of pious people who, in the age of monastic fraternities, lived in special religious fellowship in a fashion altogether different from the common usage of the time. They did not renounce their property, they took no vows of celibacy or of obedience, but they met together for pious conversation, they corresponded with each other, they had common ideas about conversion, holy living, and Christian faith and duty. They were the Quietists of the fourteenth century, and called themselves the "Friends of God."

Nicholas was the son of a rich merchant of Basel, and was born in that town about the year 1308. The most striking event in the life of Nicholas is his meeting, in 1346, with Tauler, the Dominican preacher of Strasburg, resulting in Tauler's conversion. Nicholas was burned *circa* 1395.

NICHOLS, JOHN (born in 1745, died in 1826), ranks among the most industrious and voluminous of English antiquaries and collectors. He was editor of the *Gentleman's Magazine* for nearly half a century, from 1778 till his death, and, partly in his magazine and partly in his numerous volumes of *Anecdotes and Illustrations*, made invaluable contributions to the personal history of English men of letters in the eighteenth century.

NICHOLSON, WILLIAM, a writer on natural philosophy, was born in London in 1753, and died in 1815.

NICHOLSON, WILLIAM, portrait-painter, was born at Newcastle-on-Tyne in 1784. Having settled in Edinburgh, he became one of the founders and most vigorous promoters of the Scottish Academy, of which, in 1826, he was appointed secretary. Nicholson died at Edinburgh on August 16, 1844.

NICIAS was the leader of the aristocratic party at Athens and one of the foremost figures in Athenian history during the Peloponnesian War. Although he opposed the democratic tendencies which gave the tone to Attic politics at this time, his high character for piety and honesty, combined with his wealth and influence, gained the confidence of the people, and raised him to the highest offices in their gift. (See GREECE.)

NICKEL, a chemical term, designating a metallic element which was discovered by Cronsted in 1751. In 1754 he succeeded in isolating it (in an impure state), and found it to be a "halbmetall" (semi-metal). Afterward finding it to be present largely in "kupfer-nickel," he borrowed from that mineral the name for his new element. Nickel (Ni) is one of the less abundant of elements. It is contained in the sun's atmosphere and in all meteoric iron. Of nickel minerals the following are of metallurgic importance: Nickel-blende, arsenical nickel glance, niccolo-cobaltic pyrites, garnierite. Almost invariably part of the nickel is replaced by cobalt, and not infrequently part of the arsenic by antimony, or occasionally bismuth. Nickel ores are in general complex mixtures of one or more of these minerals, with sometimes very large proportions of copper, iron, and other foreign metallic ores and gangue. The metallurgy of nickel accordingly is a complex subject which cannot be fully treated here.

Ordinary cube-nickel contains from 94 to 99 per cent. of real nickel. The purest commercial metal is that extracted from the New Caledonian ore; it often contains only a fraction of 1 per cent. of impurities. The best commercial cube-nickel (although it may contain less than 1 per cent. of impurities) is always utterly devoid of plasticity; it breaks under the hammer, although the pure metal, as was shown as early as 1804 by Richter, and confirmed by Deville in 1856, is highly ductile and tenacious. It is attracted by the magnet. Its specific gravity is 8.279 for ingot, and 8.666 for the forged

metal. It can be welded at a red heat like wrought iron, which it exceeds in relative infusibility. It does not tarnish even on long exposure to the air. Sulphureted hydrogen does not blacken it. Liquid water, even in the presence of air, has no action upon it. Aqueous non-oxidizing acids act upon it as they do on iron, but more slowly. Nitric acid and aqua regia dissolve it as nitrate and chloride respectively. When heated strongly in air it is gradually oxidized; it decomposes steam, slowly, at a red heat. In brief, it unites in itself all the virtues of iron with some of the characteristics of the noble metals, and yet its application in the mechanical arts was never thought of until Fleitmann, in 1879, made the remarkable observation that the addition of one-eighth of one per cent. of magnesium to the metal imparted to it all the plasticity of the pure metal.

Nickel Electroplating.—This art, invented by Böttcher about 1848, has developed into an important industry, especially in the United States. The best kind of solution to use is one of the double sulphate of nickel and ammonia, which should be saturated at 25° and used in conjunction with a plate of nickel as positive electrode.

Alloys.—Nickel alloys were used practically long before Cronsted's discovery of the metal. GERMAN SILVER (*q.v.*), long known to the Chinese as "Pack Tong," *i.e.*, "white copper," consists of nickel, copper, and zinc united in varying proportions—3 of copper, 1 of zinc, and 1 of nickel is said to give the most silver-like alloy. An alloy of "German" with real silver has lately been introduced as "tiers-argent;" it consists of silver 27.6, copper 59.0, zinc 9.6, nickel 3.4 per cent. In the United States, in Belgium, and in Germany, an alloy of 1 of nickel with 3 of copper serves for the making of minor coins. All these alloys are non-magnetic.

NICOBARS, a cluster of eight large and twelve small islands in the Bay of Bengal, lying to the south of the Andamans, with a population, exclusive of aborigines, of 308. The largest island, the Great Nicobar, is about thirty miles in length and from twelve to fifteen in breadth. Many of the islands are hilly, with peaks of considerable height; others are flat and covered with forests of cocoa-nut trees. All are well wooded. Tropical fruits grow in abundance, and yams of fine quality and size. The Nicobar swallow is the builder of the edible bird's nest, which, together with trepang (*bêche-de-mer*), cocoa-nuts, tortoiseshell, and ambergris, forms the whole export of the islands.

NICOL, WILLIAM, the inventor of the invaluable polarizing prism, was born about 1768, and died at Edinburgh, in September, 1851.

NICOLAI, CHRISTOPH FRIEDRICH, a German author and bookseller, was born on March 18, 1733, at Berlin, where his father was a bookseller. He was educated at Berlin, and in 1749 went to Frankfort-on-the-Oder to learn his father's business. In 1752 he returned to Berlin, and soon began to take part in current literary controversy. At that time the leaders of critical opinion in Germany were Gottsched and Bodmer. In 1755 Nicolai issued a book, *Briefe über den jetzigen Zustand der schönen Wissenschaften*, in which he tried to show that each of these writers was in his own way narrow and intolerant. This work secured for the author the friendship of Lessing, whose power as a critic was then beginning to be recognized. For many years (from 1765 to 1791), Nicolai edited the *Allgemeine deutsche Bibliothek*, a periodical which served as the organ of the so-called popular philosophers, who warred against authority in religion and against what they conceived to be extravagance in literature. The new movement of ideas represented by Herder, Goethe, Schiller, Kant, and Fichte he was

incapable of understanding, and he made himself ridiculous by foolish misrepresentation of their aims. Nicolai died on January 8, 1811.

NICOLAIEFF. See NIKOLAIEFF.

NICOLAS, SIR NICHOLAS HARRIS, English antiquary, was born March 10, 1799, at East Looe, in Cornwall, and died at Cape Curé, near Boulogne, in 1848.

NICOLE, PIERRE, one of the most distinguished of the Port-Royalists, a scholar of great excellence, and, according to Bayle (who had no particular reason for praising him), "one of the best writers in Europe," was born at Chartres in 1625. The first volume of his *Essais de Morale* appeared in 1671, and the rest of his life was chiefly occupied on this book, though he wrote many others. He died in 1695.

NICOMEDES I., son of Zipætes, succeeded his father as king of Bithynia in 278 B.C. He enlarged and consolidated the kingdom, which had been founded by his father in 288, and founded the great city of Nicomedia as the capital. He was for some time engaged in war with Antiochus of Syria, and invited the Gauls under Leonnorius and Lutarius to cross into Asia Minor and help him against his foreign and domestic enemies. His reign seems to have been long, prosperous, and uneventful; the year of his death is unknown.

NICOMEDES II., fourth in descent from the preceding, was son of Prusias II. He was so popular with the people that his father became jealous and sent him to Rome. Here he was so much favored by the senate that Prusias sent an ambassador, Menas, to Rome, giving him secret orders to assassinate Nicomedes. Menas revealed the plot, and persuaded the prince to rebel against his father. Supported by Attalus II., king of Pergamum, he was completely successful, and ordered his father to be slain before the altar of Zeus in Nicomedia. Nicomedes reigned from 149 to 91 B.C., and during his long reign adhered steadily to the Roman alliance.

NICOMEDES III., son and successor of the preceding. His brother Socrates contested the kingdom with him, relying on the alliance of the great Mithridates. Nicomedes was established on the throne by Roman help in 90 B.C., but expelled by Mithridates in 88, after a great defeat in Paphlagonia. In 84 he was restored by the Romans. In 81 Julius Cæsar, sent to him by his commander, became so intimate with him as to give rise to great calumnies at home. He died in 74 B.C., and bequeathed his kingdom to the Romans.

NICOMEDIA, a town at the head of the Sinus Astacenus, which opens on the Propontis, was built in 264 B.C., by Nicomedes I., king of Bithynia, and has ever since been one of the chief towns in this part of Asia Minor. It still retains the ancient name under the form Ismid. It was the metropolis of Bithynia under the Roman empire (see NICÆA); Diocletian made it the capital of the East, and fixed his court there. It retained its importance even after Constantinople was founded, for the roads from all parts of Asia Minor to the capital converge at Nicomedia.

NICOPOLI. See NIKOPOLI.

NICOPOLIS, or ACTIA NICOPOLIS, an ancient city of Epirus, founded 31 B.C., by Octavian, in memory of his victory over Antony and Cleopatra at Actium. The colony, composed of settlers from a great many of the towns of the neighboring countries (Ambracia, Anactorium, Calydon, Argos Amphilochicum, Leucas, etc.), proved highly successful, and the city was considered the capital of southern Epirus and Acarnania, and obtained the right of sending five representatives to the Amphictyonic council. The ruins of Nicopolis, now known as Paleoprevesa (Old Prevesa), lie about

three miles north of that city, on a small bay of the Gulf of Arta (Sinus Ambracius) at the narrowest part of the isthmus of the peninsula which separates the gulf from the Ionian Sea. Besides the acropolis, the most conspicuous objects are two theaters (the larger with twenty-seven rows of seats) and an aqueduct which brought water to the town from a distance of twenty-seven miles.

NICOSIA is the name in common use, though originally a mere corruption of the Greek name Lefkosia, for the capital of Cyprus. It is situated in the midst of the great plain of Mesaria, which traverses the island from sea to sea, and is nearly equidistant from the Gulf of Morphu at one end and that of Famagosta at the other. It became the capital of the island under the kings of the Lusignan dynasty, who were the rulers of Cyprus from 1192 to 1489. Like many other Oriental towns, Nicosia has rather an imposing effect from a distance, in consequence especially of its lofty walls, built by the Venetians to replace the previously existing circuit, which remain unbroken to the present day. Above these towers the beautiful Gothic cathedral, now converted into a mosque. But the interior of the city is a mere labyrinth of narrow streets, and presents an aspect of great decay. The population, which was previously estimated at 16,000, was found, by an actual census, to amount to only 11,197.

NICOSIA, a city of Italy, in the province of Catania, in Sicily, about fifty miles west of Catania, near the rise of the Seminato. It is a picturesque mediæval-looking place, with a cathedral in the Norman style, a communal library, mineral wells, and a trade in grain, wine, and oil. The population of the commune was 15,460 in 1881.

NICOTINE. See TOBACCO.

NIEBUHR, BARTHOLD GEORG, the historian of ancient Rome, was the son of Karsten Niebuhr, noticed below, and was born at Copenhagen on August 27, 1776. His family was of Hanoverian extraction. From the earliest age young Niebuhr manifested extraordinary precocity, and especial interest in history and politics. From 1794 to 1796, being already a finished scholar and acquainted with several modern languages, he studied at the university of Kiel, applying himself to mathematics, logic, philosophy, and other studies previously neglected. In 1800 he married and settled at Copenhagen. In 1804 he became chief director of the National Bank, but in September, 1806, after negotiations which had extended over more than a year, quitted this for a similar appointment in Prussia.

He arrived in Prussia on the eve of the catastrophe of Jena, and shared to the full all the disasters and miseries which overwhelmed the monarchy. He accompanied the fugitive government to Königsberg, where he rendered considerable service in the commissariat, and was afterward still more useful as commissioner of the national debt, and by his opposition to ill-considered schemes of taxation. He was also for a short time Prussian minister in Holland, where he endeavored, without success, to contract a loan. In 1810 he retired for a time from public life, accepting the more congenial appointment of royal historiographer and professor at the university of Berlin. He commenced his lectures with a course on the history of Rome. The enthusiastic reception these experienced filled him with delight. He recognized that he had found his vocation, and henceforth regarded the history of Rome from the earliest age to Augustus as the task of his life. The first two volumes, based upon his lectures, were published in 1812, but attracted little attention at the time, owing to the absorbing interest of political events. In 1813 Niebuhr's own attention was diverted from history by

the uprising of the German people against Napoleon; he entered the landwehr, and ineffectually sought admission into the regular army. He edited for a short time a patriotic journal, *The Prussian Correspondent*, joined the headquarters of the allied sovereigns, and witnessed the battle of Bautzen, and was subsequently employed in some minor negotiations. He next accepted the post of ambassador at Rome, which he probably thought would assist his historical labors, and departed to assume that office in July, 1816. During his residence in Rome he discovered and published fragments of Cicero and Livy, aided Cardinal Mai in his edition of Cicero *De Republica*, and shared in framing the plan of Bunsen and Platner's great work on the topography of ancient Rome, to which he contributed several chapters. He also, on a journey home from Italy, deciphered in a palimpsest at St. Gall the fragments of Flavius Merobaudes, a Roman poet of the fifth century. In 1823 he resigned the embassy and established himself at Bonn, where the remainder of his life was spent, with the exception of some visits to Berlin as councilor of state. He here rewrote and republished (1827-28) the first two volumes of his *History*, and composed a third volume, bringing the narrative down to the end of the First Punic War, which he did not himself entirely complete, but which, with the help of a fragment written in 1811, was edited after his death by Professor Classen. He died on January 2, 1831.

NIEBUHR, KARSTEN, Eastern traveler, was born at Lüdingworth, Lauenburg, on the southern border of Holstein, March 17, 1733, the son of a small farmer. He had little elementary education, and for several years of his youth had to do the work of a peasant. His bent was toward mathematics, and he managed to obtain some lessons in surveying. It was while he was working at this subject that one of his teachers, in 1760, proposed to him to join the expedition which was being sent out by Frederick V. of Denmark for the scientific exploration of Egypt, Arabia, and Syria. To qualify himself for the work of surveyor and geographer, he studied hard at mathematics for a year and a half before the expedition set out, and also managed to acquire some knowledge of Arabic. The expedition sailed in January, 1761, and, landing at Alexandria, ascended the Nile and devoted some time to the examination of the pyramids and of the hieroglyphic writings of Egypt. Niebuhr stayed fourteen months at Bombay, and then returned home by Muscat, Bushire, Shiraz, and Persepolis, visited the ruins of Babylon, and thence went to Bagdad, Mosul, and Aleppo. After a visit to Cyprus he made a tour through Palestine, crossing Mount Taurus, to Brussa, reaching Constantinople in February, 1767, and Copenhagen in the following November. On his return Niebuhr at once set himself to the task of preparing the records of the expedition. His first volume, *Beschreibung von Arabien*, was published at Copenhagen in 1772, the Danish Government defraying the expenses of the abundant illustrations. This was followed in 1774-78 by other two volumes, *Reisebeschreibung von Arabien und Anderen umliegenden Ländern*. The fourth volume was not published till long after his death in 1837, under the editorship of Niebuhr's daughter. To a German periodical, the *Deutsches Museum*, Niebuhr contributed papers on the interior of Africa, the political and military conditions of the Turkish empire, and other subjects. He married in 1773, and for some years held a post in the Danish military service which enabled him to reside at Copenhagen. In 1778, however, he accepted a position in the civil service of Holstein, and went to reside at Meldorf, where he died, April 26, 1815.

NIELLO (Italian form of Latin *nigellum*, diminutive of *niger*, "black"), a method of producing delicate and minute decoration on a polished metal surface by incised lines filled in with a black metallic amalgam. In some cases it is very difficult to distinguish niello from black enamel; but the black substance differs from true enamel in being metallic, not vitreous.

The earliest specimens of niello now existing belong to the Roman period. Two fine examples are in the British Museum. One is a bronze statuette of a Roman general, nearly two feet high, found at Barking Hall, in Suffolk. The dress and armor have patterns partly inlaid in silver and partly in niello. The dark tint of the bronze rather prevents the niello from showing out distinctly. This statuette is apparently a work of the first century. The other example is not earlier than the fourth century. It is a silver casket or lady's toilet-box, in which were found an ampulla and other small objects, enriched with niello-work. From Roman times till the end of the sixteenth century the art of working in niello seems to have been constantly practiced in some part at least of Europe, while in Russia and India it has survived down to the present day.

NIEMCEWICZ, JULIAN URSIN, was born in 1757, in Lithuania. In the earlier part of his life he acted as adjutant to Kosciusko, was taken prisoner with him at the fatal battle of Maciejowice (1794), and shared his captivity at St. Petersburg. On his release he traveled for some time in America, where he married. He died as an emigrant at Paris in 1841. Niecewicz tried many styles of composition. He wrote comedies (one of which, *The Return of the Deputy*, enjoyed a great reputation), tragedies, and a novel, *John of Tenczyn*, in the style of Scott, which gives a vigorous picture of old Polish days. He was also the author of a *History of the Reign of Sigismund III*.

NIEPCE, JOSEPH NICÉPHORE, one of the inventors of photography, was born at Châlon-sur-Saône on March 7, 1765. He gave himself to mechanical and chemical researches; and in 1811 directed his attention to the rising art of lithography. In 1813 the idea of obtaining sun pictures first suggested itself to him in this connection; the history of the subsequent development of the conception will be found under DAGUERRE and PHOTOGRAPHY. Niepce died at Gras, his property near Châlon, on July 3, 1833. A nephew, Claude Félix Abel Niepce de Saint-Victor (1805-1870), served with distinction in the army, and also made important contributions toward the advancement of the art of photography (actinence).

NIEVRE, a central department of France, formed out of the old province of Nivernais with a small portion of the Orléanais, is bounded northwest by Loiret, north by Yonne, northeast by Côte d'Or, east and southeast by Saône-et-Loire, southwest and west by Allier, and west by Cher. It belongs partly to the basin of the Loire, partly to that of the Seine. The largest Seine tributary in Nièvre is the Yonne, which rises in the southeast, passes by Clamecy, and carries along with it the northern part of the Nivernais Canal. The Cure, the principal affluent of the Yonne (with which, however, it does not unite till after it has left the department), is the outlet of a lake, Lac des Settons, which serves as a reservoir for the practical regulation of the river. The watershed between the two river systems runs, like the general slope of the department, from southeast to northwest, the highest summits belonging to the Morvan, an uplift of granite, porphyry, and gneiss, which extends into Saône-et-Loire, Côte d'Or, and Yonne. Here stands Mount Préneley (2,790 feet), the highest point in Nièvre; and seven or eight miles north-northwest, at an altitude of nearly

2,000 feet, is Château-Chinon, the highest town in the department. The lowest level in the department is 443 feet, at the exit of the Loire. Morvan ("Black Forest") is one of the most picturesque portions of France; and the western district, known as the "Bon Pays," is one of its finest pastoral areas, terminating toward the Loire in hills generally clad with vines. Owing to its greater elevation and the retention of the rain-water on its hard surface in the shape of ponds and streams, Morvan shows a mean temperature 6° Fahr. lower than that of the western district, which, in the valley of the Loire, is almost identical with that of Paris, (62° Fahr.) At Nevers the annual rainfall amounts to only eighteen inches; but in Morvan it is about three times as great.

The area of the department is 2,631 miles, one-half being arable land, a third woods, and a tenth pasture, while forty-two square miles are occupied by vines. The vintage of 1881 yielded 5,304,816 gallons of wine—the best wines of Pouilly, a locality which besides sends a great quantity of its grapes to Paris for table use. The Nièvre forests, consisting of oak, beech, hornbeam, and elm, supply about three-fifths of the firewood required for the Parisian market. The coal field of Decize, with its seven seams making a total thickness of forty feet, yielded 200,000 tons in 1888. The population of the department is 347,576. Nièvre is divided into 4 arrondissements, 25 cantons, 313 communes. It forms the diocese of Nevers, and part of the districts dependent on the *corps d'armée* and the court of appeal of Bourges. The chief towns of the arrondissements are Nevers, Château Chinon (2,613 inhabitants), Clamecy (5,536), and Cosne (7,401). Other places of note are La Charité (4,826), with an old church of the order of Cluny; Decize (3,927), with an old church and interesting ruins; and St. Pierre le Moutier (3,080), having an old Cluniac monastery.

NIEZHIN, NIEJIN, or NYEZHIN, a district town of Russia, situated in the government of Tchernigoff, fifty miles southeast of that town, on the railway between Kursk and Kieff. The old town is built on the left bank of the (canalized) river Oster, and its suburbs, Novoye Myesto and Magherki, on the right. The 23,000 inhabitants are mostly Little Russians and Jews.

NIGER, one of the most famous of African rivers, has its headwaters on the north side of the mountains (known as Kong Mountains and by various other local names) which run parallel with the coast of Upper Guinea and Sierra Leone at a distance of about 200 miles, flows northeastward as far as 17° 30' N. latitude and the meridian of Greenwich, and then turning southeastward reaches the Gulf of Guinea after a total course of about 2,600 miles. The main stream bears in different districts a great variety of names—Jolibá (Dholiba or Dialiba), Kworra (Quorra), Mayo, Kaki 'n ruwa, etc.; and the same is true of the great eastern confluent, Benue, Shary or Tchadda.

As a highway of commerce the Niger has been little used, trading steamers having mainly confined their operations to the river below the confluence. But since 1857 the area of supply has been considerably extended, the quantity of goods (chiefly oil and shea butter) collected has greatly increased, and steamers five or six times the size of the vessels formerly used have been introduced. The delta region has become more populous, and trading posts more frequent. The Church Missionary Society, which, except the British Government, has done more than any other agency for opening up the lower Niger, has stations at four places on the coast, at Osamare (120 miles inland), Onitsha (twenty miles farther), Lokoja (ninety miles), Kipo Hill, Egan (ninety miles), Shonga (ninety-four miles farther, and only twelve or fifteen short of Rabba). Lokoja is near

the site of the experimental farm maintained by the government for some years from 1841.

NIGER, C. PESCENNIUS, governor of Syria under the emperor Commodus, and one of the rivals of Septimius Severus for the succession after the murder of Pertinax, belonged to an Aquinum family of equestrian rank, and owed his promotion to the Syrian command not only to the interest of Narcissus, the favorite of Commodus, but also to his known merits as a soldier. He was saluted emperor by the troops at Antioch as soon as the death of Pertinax became known, in the spring of 193 A.D., but he unaccountably delayed marching on Rome until he learned that Severus had assumed the offensive. He now strongly garrisoned Byzantium as well as the principal towns of Asia Minor, but after his legate Æmilianus had been defeated and slain near Cyzicus he himself was driven from Nicæa and decisively routed, with great slaughter, in the neighborhood of the Cilician Gates. Having failed in an effort to escape toward the Euphrates, he was brought back and put to death in 194.

NIGHTINGALE (Anglo-Saxon, *Nihtegale*, literally "singer of the night"), the bird justly celebrated beyond all others by European writers for the admirable vocal powers which, during some weeks after its return from its winter quarters in the south, it exercises at all hours of the day and night. In great contrast to the Nightingale's preëminent voice is the inconspicuous coloration of its plumage, which is alike in both sexes, and is of a reddish-brown above and dull grayish-white beneath, the breast being rather darker, and the rufous tail showing the only bright tint. On the cocks being joined by their partners, the work for which the long and hazardous journey of both has been undertaken is speedily begun, and before long the nest is completed. This is of a rather uncommon kind, being placed on or near the ground, the outworks consisting chiefly of a great number of dead leaves ingeniously applied together so that the plane of each is mostly vertical. In the midst of the mass is wrought a deep, cup-like hollow, neatly lined with fibrous roots, but the whole is so loosely constructed, and depends for lateral support so much on the stems of the plants, among which it is generally built, that a very slight touch disturbs its beautiful arrangement. Herein from four to six eggs of a deep olive color are duly laid, and the young hatched. Toward the end of summer the Nightingale disappears, and but little has been observed of it in its winter retreats, which are presumably in the interior of Africa. One of the few records of it at that season proves that it visits the Gold Coast.

The Nightingale is the *Motacilla lusciniæ* in part of Linnæus, and the *Daulias lusciniæ* of some modern ornithologists.

NIGHTSHADE, a general term for the genus of plants known to botanists as *Solanum*. The species to which the name of Nightshade is commonly given in England is the *Solanum Dulcamara*, L., which is also called the Bittersweet or Woody Nightshade. It is a common plant in damp hedgebanks and thickets, scrambling over underwood and hedges. It has slender slightly woody stems, with alternate lanceolate leaves more or less cordate and auriculate at the base. The flowers are arranged in drooping cymes, and resemble those of the potato in shape, although much smaller. The corolla is rotate, of lilac-blue color with a green spot at the base of each segment, and is furnished with yellow sessile anthers united at their margins so as to form a cone in the center of the corolla. The flowers are succeeded by ovate scarlet berries, which in large doses appear to be poisonous or, to say the least, dangerous to children, cases of poisoning by them hav-

ing occurred. The plant derives its names of bitter-sweet and *Dulcamara* from the fact that its taste is at first pleasantly sweet and then bitter. The young stems collected in autumn have been used in medicine as an alterative in rheumatism and certain skin diseases, but are little used at the present time except by homœopaths, by whom *Dulcamara* is given as an anticatarrhal remedy in all symptoms produced by cold arising from exposure to damp. It owes its medicinal activity to a bitter principle yielding by decomposition sugar and the alkaloid "solania." This principle has been found in small quantity in the leaves, stalks, and berries. *Dulcamara* also contains another glucoside "dulcamarin," which when boiled with dilute acid splits up into sugar and "dulcamaretin." The term Deadly Nightshade is often erroneously applied to this plant, and the popular usage has even been confirmed by so eminent a botanist as Bentham. It is generally accepted, however, that the deadly nightshade is *Atropa Belladonna*, L.

Solanum Dulcamara is subject to the same parasitic fungus (*Peronospora infestans*) as the potato, and may serve as a medium for communicating the spores to the potato if not removed from the hedges of the fields where potatoes are grown.

The Garden Nightshade, *Solanum nigrum*, L., differs from *S. Dulcamara* in having white flowers in small umbels and globose black berries. It is a common weed in gardens and waste places, growing about twelve or eighteen inches high, and has ovate, entire or sinuate-dentate leaves.

The name of Nightshade is applied to plants of different genera in other countries. American Nightshade is a species of *Phytolacca*, the Three-leaved Nightshade is a *Trillium*; the Malabar Nightshade is a *Basella*; the Bastard Nightshade is a *Rivina*; and the Enchanter's Nightshade is *Circœa lutetiana*. The last-named is not known to possess any poisonous property, and the name seems to have been given to it in the first place in mistake for a species of *Mandragora* (see MANDRAKE).

NIGRITIA. See SOUDAN.

NIIGATA, a city of Japan, with a population of about 34,000, the chief town of the province of Echigo, and one of the ports open to foreign trade since 1869, lies on the west coast of the island of Nippon, on a narrow strip of sandy ground between the left bank of the Shinano and the sea, which though quite at hand is shut out from view by a low range of sandhills.

NIJAR, a town of Spain in the province of Almeria, fourteen miles to the east-northeast of that town, occupies an exposed site on the southern slope of the Sierra Alhamilla. The population of the ayuntamiento in 1889 was 16,661.

NIJNE-TAGHILSK, currently known as TAGHIL, a town and iron-work of Russia, situated in the government of Perm and district of Verkhoturie, 100 miles to the southeast of the district town. Nijne-Taghilsk is a central foundry for a number of iron-mines and eleven other works scattered in the valley of the Taghil and its tributary, the Salda.

NIJNE-TCHIRSKAYA, a Cossack village, or stanitsa, of Russia, chief town of the Second Don district of the Don Cossack government, is situated on the right bank of the Don, at its junction with the Tchir, twenty-five miles below the Kalatch station of the Volga and Don Railway, and is the chief point for corn and linseed from the basin of the middle Don. Its 14,000 inhabitants (with the 11,000 of Verkne-Tchirskaya, two miles distant) are mostly engaged in agriculture and cattle-raising, favored by the extensive landholdings (about 700,000 acres) belonging to the Cossacks of both stanitsas.

NIJNI-LOMOFF, a district town of Russia, in the

government of Penza, sixty-nine miles west-northwest from the capital of the government, on the Lomoff; the railway from Penza to Tula passes within seventeen miles.

NIJNI-NOVGOROD, or NIJNIY-NOVGOROD, a government of Central Russia, bounded by Vladimir on the west, by Yaroslaff and Vyatka on the north and northeast, by Kazan and Simbirsk on the east, and by Penza and Tamboff on the south, with an area of 19,800 square miles, two-thirds being on the right and the rest on the left bank of the Volga. The climate is severe, especially in Zavoljje, where the average yearly temperature is 5.6° Fahr. lower than at Nijni. The population in 1880 reached 1,376,000; they are mostly Great Russians, Mordvinians (50,600), and Tartars (42,650); the Tcheremisses numbered 5,630, and the Jews about 1,500.

The chief occupation of the inhabitants is agriculture, but only 38 per cent. of the area is under crops. The government is divided into eleven districts, having as their chief towns Nijni-Novgorod (50,000 inhabitants), Ardatoff (3,500), Arzamas (10,500), Balakhna (4,000), Gorbatoff (3,000), Knyaghinin (2,500), Lukoyanoff (10,000), Makarieff (2,000), Semenoff (3,000), Sergach (4,000), and Vasilursk (3,000).

NIJNI-NOVGOROD, or simply NIJNI or NIJNIY, capital of the above government, is situated at the confluence of the Oka and Volga, 276 miles by rail to the east of Moscow. It occupies a most advantageous position on the great artery of Russian trade, at a place where the manufactured and agricultural products of the basin of the Oka meet with the metal wares from that of the Kama, the corn and salt brought from the southeastern provinces, the produce of the Caspian fisheries, and the various wares imported from Siberia, Central Asia, Caucasus, and Persia. It has thus become the seat of the great Makarievskaya fair, and one of the chief commercial centers of Russia.

The town has a settled population of 50,000 inhabitants, rising to 250,000 or perhaps to 300,000 during the fair. The inhabitants are nearly all Great Russians, and many of them are Nonconformists. The mortality exceeds the birth-rate. The educational institutions, which are few, include, besides the military school, one college (gymnasium) for boys and one for girls, a technical school, a theological seminary, two schools for sons and daughters of the clergy, and a dozen primary schools. The aggregate number of scholars being 3,000, nearly 8,000 children receive no public instruction. There is a small public library, and a single periodical, *The Exchange News*; the five printing-offices are employed almost exclusively by the public institutions. Of late the statistical committee has issued a most valuable publication, the *Nijegorodskiy Sbornik*, containing all kinds of statistical, ethnographical and archaeological information about the government.

NIKKO, one of the chief religious centers of Japan, is beautifully situated on Nikko Zan (Mountains of the Sun's Brightness) in Tochigi ken (province of Shimotsuke), about ninety-two miles north-northwest of Tokio (Yedo) by the ordinary route *via* Utsunomiya. The town is properly called Hachi-ishi, but this name is very little used in comparison with that of the shrines. From 1644 to 1868 the "abbots" of Nikko were always princes of the imperial blood; thirteen of them are buried within the sacred grounds. Though the magnificent abbots' residence was destroyed by fire in 1861, and the temples have lost most of their ritual and much of their material splendor, enough remains to astonish by excellence and bewilder by variety of decorative detail.

NIKOLAIEFF, the chief naval station of Russia

on the Black Sea, is situated in the government of Kherson, forty-one miles northwest of the government capital. It stands most advantageously a little above the junction of the Ingul with the Bug, at the head of the *liman*, or estuary, of the Bug, and is the natural outlet for the basin of that river. The estuary, which is twenty-three miles long, enters that of the Dnieper; and Nikolaieff, forty-two miles distant from the Black Sea, thus combines the advantages of a good seaport with those of an inland town. The entrance to the double estuary of the Bug and Dnieper is protected by the fortress of Otchakoff and by the fort of Kinburn, erected on a narrow headland opposite, while several forts surround Nikolaieff on both sides of the Bug and protect it from an attack by land. The town, which occupies two flat peninsulas between the Bug and the Ingul, extends up the banks of the latter, while its suburbs spread still farther into the steppe, the whole covering an area of six square miles. Pop. (1890), 75,000.

NIKOLAIEVSK, a district town of Russia, in the government of Samara, on the right bank of the Irghiz, lies forty-eight miles from the Volga and 109 miles to the southwest of Samara. Its 10,000 inhabitants are mostly Raskolniks, or of the "United Church," and about 2,000 Tartars occupy a separate part of the town. The chief occupation of the Russian and Tartar inhabitants is agriculture and cattle-breeding, in the products of which the merchants carry on a lively trade.

NIKOLAIEVSKAYA SLOBODA, a village of Russia, in the government of Astrakhan and district of Tsareff, three miles from the Volga, on its left bank, opposite Kamuishin.

NIKOPOL, a town of Russia, in the government and district of Ekaterinoslaff, on the right bank of the Dnieper, seventy-six miles to the south-southwest of Ekaterinoslaff. The town, formerly called Nikitin Rog, occupies an elongated peninsula between two branches of the Dnieper, at a point where its banks are covered on both sides and to a considerable distance with marshes, and has been for many centuries one of the places where the middle Dnieper could most conveniently be crossed.

NIKOPOLI, or NICOPOLI, a city of Bulgaria, the chief town of a circle in the district of Plevna, is picturesquely situated on the south bank of the Danube, at the confluence of the Osma. According to the census of 1881 it had only 4,652 inhabitants.

NILE. This mighty river, which after a course of 3,370 miles pours into the Mediterranean a low-water current of 61,500 cubic feet per second, has its cradle in the Victoria Nyanza, an enormous lake in Central Africa where the line of the equator is crossed by 32°, 33°, and 34° of E. longitude from Greenwich, somewhere about 4,000 feet above the sea.

In 1875 Stanley proved that the only outflow from Victoria Nyanza was by the Ripon Falls on the north side of the lake. These falls (named after Earl de Grey and Ripon, president of the Royal Geographical Society in 1859) were discovered July 28, 1862, by Captain Speke, but from native accounts he was led to believe that other streams (such as the Luajerri) issued from the lake. The Nile, as it drops about twelve feet over the rocks, has a breadth of 400 to 500 feet, divided into several sections by a number of wooded isles. For the next 300 miles the Victoria Nile or Somerset River, as this section is called, has all the character of a mountain stream racing swiftly along a rocky channel often walled in by cliffs (at times 180 feet high) and broken by picturesque islands and countless rapids. At first for 117 miles its course is north-northwest, but reaching the Khor Kafu (on which Mruli stands), it takes the northeast direction of this channel, and it is not till 2°

N. latitude that it again turns northwest toward the Albert Nyanza. But the great feature of the Victoria Nile is the Murchison Fall, about 2° 18' N. latitude and 31° 50' E. longitude, where the river rages furiously through a rock-bound pass, and plunges at one leap of about 120 feet into a gloomy abyss. Below this point, continuing between steep forest-covered hills, it gradually calms down into a stream so slow and steady that at certain seasons it is only from the scarcely perceptible drifting of the little green water plants, called *Pistia Stratiotes*, that the flow can be observed. About twenty or twenty-five miles below the fall it enters the north end of the Albert Nyanza.

This lake was first reached by Baker on March 14, 1864, near Vacovia, on the east coast, a small village of fishermen and saltmakers. From a granite cliff 1,500 feet above the water, he looked out over a boundless horizon on the south and southwest, and toward the west descried, at a distance of fifty or sixty miles, blue mountains about 7,000 feet high. The Albert Nyanza was consequently entered on his map as a vast lake extending from 2° S. latitude to 2° 50' N. latitude, or a distance of about 380 miles. But the circumnavigation of the lake by Gessia Pasha (1876), Mason Bey, and Dr. Emin Bey, leaves no doubt that its real dimensions are—length ninety-seven miles, average breadth twenty-two miles, and area about 2,000 square miles. Instead of the lake being, as Baker contended, one of the great sources of the Nile, its functions are those of a large backwater.

Escaping by an island-studded channel from the northwest corner of the Albert Nyanza, the Nile, which now takes the name of Bahr al-Jebel, or River of the Mountains, continues to flow in a general northward direction.

The great plain which the Nile enters below Lado, about 5° N. latitude, slopes so gradually toward the north that the river falls only 300 feet in a stretch of more than 650 miles between Gondokoro and Khartoum. As the river has gradually raised the level of both bed and banks, an overflow takes place, and lagoons or side-channels are formed wherever the bank breaks down; and as these, from their position, naturally act as settling-ponds, they get rapidly silted up.

Up to about 7° 25' N. latitude, in spite of this condition of things, the Nile maintains a fairly definite course, with a considerable depth of water in its main current, but at this point it splits up into two branches as if to form a delta. The left branch, which retains the name Bahr al-Jebel, but which may be conveniently distinguished by the Denka name of Kir, continues in the line of the river, and the right branch, or Bahr al-Zeráf (Giraffe River), tends rather more toward the east. After flowing respectively about 160 and 140 miles, they reach the Bahr al-Ghazál, slowly gliding east with a slight deflection to the south. The whole region is a vast expanse of low, swampy lands crossed by secondary channels, and flooded for many miles in the rainy season. At the junction of the Bahr al-Ghazál and the Kir the permanently submerged area is usually named Lake No on our maps, but the Arabs simply call it the confluence—Mokren al-Bohír.

About ninety-five miles below the junction of the Kir, and thirty below that of the Bahr al-Zeráf, the White Nile receives its first great affluent from the east. The Sobát, as it is called, has its headwaters (largely unexplored) distributed over a wide area—the southmost rising possibly as far south as 4° N. latitude in the hilly country of Atuka, the eastmost in Kaffa, and the northmost about 9° in the Berta mountain.

The northward progress of the White Nile for the next 300 miles is through a great plain stretching from

the spurs of the Abyssinian highlands in the east to the hilly districts of Takalla, and Kordofan in the west, and consisting almost exclusively of red and other sandstone, often flat as a pavement. Escaping from the swampy region, the river again forms a well-marked channel, with regular and sometimes high banks. Throughout the whole distance indicated a striking confirmation of Baer's law is afforded—the fairway or deeper side of the stream generally keeping to the eastern shore. About sixty miles below the Sobát mouth lies (on the right bank) Fashoda, an Egyptian town founded in 1867 on the site of Denab, the old "capital" of the Shilluks. In the neighborhood of Mahadat Abu Zaid begin the Sunt Islands, so called from the Arab name for the *Acacia nilotica*, a tree characteristic of the White Nile.

At Khartoum (Khartúm), in $15^{\circ} 37'$ N. latitude, the White Nile is joined by its greatest eastern confluent, the Blue Nile (Bahr el-Azrak). This river has its head reservoir in Lake Tana (Tsana), which is so situated that the lines of 12° N. latitude and $37^{\circ} 2'$ E. longitude cut it into four nearly equal portions. The height of the lake is 5,658 feet (Rohlf's). From east to west the breadth is about forty miles, and the area is estimated at 2,980 square miles. Between Dega and Zegi a depth of 246 feet has been found, and between Korata and Zegi 219. The Blue Nile, or Abai as it is called in Abyssinia, rises on the northward slopes of a cluster of mountains (Mount Gesh, etc.) about 11° N. latitude, and flowing northward enters Lake Tana near the southwest corner, to issue again at no great distance. From east and south and north the mountain streams pour down into the river—its eastmost tributary probably rising east of Magdala, and its southmost between 8° and 9° N. latitude. At Fazokl or Famaka, $11^{\circ} 17'$ N. latitude, it begins to escape from the mountains; about 130 miles farther down, after passing Rosaires and Karkoj on the right and Sennaar on the left, it is joined by the Dinder; and thirty-five miles more bring it to the confluence of the Rahad (Ra'ad) and the town of Abú Haraz. Beyond this point it flows through the most fertile portion of the Egyptian Soudan, the plain on the left hand more especially being a great grain-growing district. The total length of the Abai or Blue Nile may be estimated at 960 miles.

On the northwest side of the mountains which inclose Lake Tana are some of the headwaters of the Atbara, another important tributary of the Nile; but it does not reach the main stream till about 200 miles below Khartoum. Its principal branch, the Settít or Takazze, has a course of about 420 miles through the Abyssinian plateau before it joins or (more strictly) is joined by the river which gives its name to the united stream. The Khor-el-Gash, or Mared, though a considerable river in its upper regions, reaches the Atbara (and thus the Nile, of which it is the northmost affluent) only during a heavy rainy season.

After receiving the Atbara the Nile continues for 650 miles through the Nubian desert, where the volume of the river suffers continual diminution from the extreme dryness of the air, without being recruited by a single drop of water. Between Berber (an important town on the right bank thirty miles below the Atbara) and Wády Halfa (about 600 miles) rapids and cataracts follow at intervals. The highest of these, the fifth cataract of the Nile, is situated about forty miles below Berber; the fourth, 170 miles farther down, below Shitab; the third, 230 miles farther, at Hannek, and the second just above Wády Halfa. At Assuan (200 miles lower) are the first cataracts. Beyond that point the river flows through the wonderful valley which has already been described in the article EGYPT.

NÍLGIRI, a petty state in Orissa, Bengal, India, bounded on the north and west by Morbhanj state and on the south and east by Balasor district, with an area of 278 square miles, of which only one-third is under cultivation. The population in 1890 was 60,000.

NÍLGIRI HILLS, or NEILGHERRY HILLS, a district and range of mountains in the Madras presidency, India. The district until recently consisted exclusively of a mountain plateau lying at an average elevation of 6,500 feet, with an area of about 725 square miles. In 1873 this was increased by the addition of the Ochterlony valley in the southeast Wainád, and again, in 1877, by other portions of the Wainád, making a total area of 957 square miles. The administrative headquarters is at Utakamand, which is also the summer capital of the government of Madras.

The population of the district in 1890 was about 100,000. The only town with more than 5,000 inhabitants is Utakamand, with a population of 12,335.

NIMÁR, a district in the Central Provinces, India. The area is 3,340 square miles, of which only 659 are under cultivation. The population in 1881 was 231,341 (embracing 199,454 Hindus, 24,426 Mohammedans, 5,282 aborigines—the most numerous tribe of these being the Bhíls). Khandwa town is the administrative headquarters.

NIMEGUEN, NIMWEGEN or NYMEGEN, probably the oldest of all the cities of the Netherlands, is situated in the province of Guelderland, on the south bank of the Waal, eighty miles from the sea and seventeen miles northwest of Cleves. Between 1656 and 1679 Nimeguen was the seat of a university; it has now nothing higher than a gymnasium. Tools, gold and silver work, leather, furniture, tobacco, etc., are the chief products of the local industry; and a good deal of traffic is carried on by means of both the river and the railway. The population of the town in 1870 was 19,196; that of the commune increased from 22,929 (15,984 Roman Catholics, 5,806 Dutch Reformed, 408 Jews) in 1875 to 25,000 in 1880.

NÎMES, a city of France, lies 450 miles south-southeast of Paris by the Clermont-Ferrand Railway, and eighty miles northwest of Marseilles. The importance of the place is due to its central position between the Rhone, the Cevennes, and the sea, to the richness of the surrounding district, which before the ravages of the *Phylloxera* was clothed with vines, to its commerce and industry, and lastly to its archæological treasures. No town in France can show so many remains of the Roman period.

At the close of the Middle Ages the industries of Nîmes were raised to a state of great prosperity by a colony from Lombardy and Tuscany. Since then, however, the numbers of this class have hardly increased, while the population of the city has been doubled. The silk manufacture no longer occupies all hands. Upholstery materials, carpets, handkerchiefs, tapes, braidings, hosiery, leather, clothes, and boots and shoes are also produced; and, coal being worked in the neighborhood, a number of foundries have been established. Nîmes is, besides, one of the great southern markets for wine and brandy, silks and cocoons; and there is a good trade in grain, groceries, and colonial wares. The population of the city in 1881 was 61,210; that of the commune was 62,394 in 1871, and 63,552 in 1881.

NIMROD, apart from the mere mention of his name in Micah v. 5, occurs only once in Scripture, namely, in Gen. x. 8-12, where, in a Jehovistic portion of the genealogy of the nations there given, we are told that "Cush begat Nimrod, who was the first mighty one in the earth (he was a mighty hunter before Jehovah,

wherefore it is said—A mighty hunter before Jehovah even as Nimrod), and the beginning of his kingdom was Babel, and Erech and Accad, and Calneh in the land of Shinar. Out of that land he went forth into Asshur and builded Nineveh," etc. Just as Enos was the first to call upon the name of Jehovah, and Noah the first to plant vines, so is Nimrod the first mighty ruler in the earth, and as such at the same time a mighty hunter before Jehovah, after the manner of the Oriental sovereigns of old. By the Hebrews the Assyrio-Babylonian empire was at all periods regarded as the prototype of the worldly power; and it is of this kingdom that Nimrod here figures as the founder—not in its prehistorical but in its historical form as actually subsisting at the time of the writer. This is apparent, not only from the general character of the genealogical table, but also from the enumeration of the cities in the land of Shinar and Asshur. As founder of the kingdom, Nimrod represents both kingdom and people; the genealogy knows no distinction between the hero and the nation—the latter is the family of the former. When, therefore, Nimrod is said to be descended from Cush, the mighty nation of Asshur and Babel (which in Gen. x. 22 is regarded as belonging to Shem) is also by the Jehovist assigned to Cush.

NINEVEH, the famous capital of the Assyrian empire, called Ninua or Ninâ on the monuments. Though the city appears to have been entirely destroyed in the fall of the empire the name of Nineveh continued, even in the Middle Ages, to be applied to a site opposite Mosul on the east bank of the Tigris, where gigantic *tells* or artificial mounds, and the traces of an ancient city wall, bore evident witness of fallen greatness. The walls inclose an irregular trapezium, stretching in length about two and one-half miles along the Tigris, which protected the city on the west. The greatest breadth is over a mile. The most elaborate defenses, consisting of outworks and moats that can still be traced, were on the southern half of the east side, for the deep, sluggish Khausar, which protects the northern half of this face, then bends around toward the Tigris, and flows through the middle of the town, so as to leave the southeast of the city more open to attack than any other part. The principal ruin mounds within the walls are that of Kuyunjik, north of Khausar, and that of the prophet Jonah (Nebî Yûnus) south of that stream. The latter is the traditional site of Jonah's preaching, and is crowned by an ancient and famous Mohammedan shrine. The systematic exploration of these ruins is mainly due to Layard (1845-46), whose work has been continued by subsequent diggers. These researches leave no doubt as to the correctness of the local tradition. Not only have magnificent remains of Assyrian architecture and sculpture been laid bare, but the accompanying cuneiform inscriptions throw much light on the history of the city and its buildings.

NING-PO, or NING-PO-FOO (*i.e.*, City of the Hospitable Waves), a great city of China, one of the five sea-ports thrown open to foreign trade in 1842 by the treaty of Nanking, and the principal emporium of the province of Chekeang, stands in a plain bounded by mountains toward the west, on the left bank of the Takia or Ning-po river, about sixteen miles from its mouth. It is surrounded by a fine old wall, twenty-five feet high and sixteen feet broad, pierced by six gates and two passages for ships in its circuit of four to five miles. As is natural in a place long celebrated for its religious and educational preëminence, there is no lack of temples, monasteries, and colleges, but few of these are of any architectural significance. Brick is the ordinary building material, and the dwelling-houses are mostly of one story. Silks, cottons, carpets, furniture,

whitewood carvings, and straw hats are the chief products of the local industry. Large saltworks are carried on in the vicinity, and thousands of fishermen are engaged in catching the cuttle-fish. In spite of the powerful competition of Shanghai, Ning-po has a valuable foreign trade. It is regularly visited by the vessels of the China Navigation Company and the Chinese Merchants Steam Navigation Company. From 216,191 register tons in 1873 the tonnage of the port has increased to 303,109. The principal import is opium. Lead for packing tea was formerly a leading item, but it now enters mainly by other ports. After the storming of Chinhaï—the fortified town at the mouth of the river—on October 10, 1841, the British forces quietly took possession of Ning-po on the 12th. In 1864 the Taipings held the town for six months. Missions are maintained in Ning-po by the Romish Church, by the Church Missionary Society (1848), the American Presbyterians, the Reformed Wesleyans, the China Inland Mission (1857), etc. A mission hospital was instituted in 1843. The population of the city and suburbs is estimated at from 400,000 to 500,000.

NINIAN (NINIANUS or NYNIAS), ST., was, according to the earliest account of him we possess—that of Bede—a bishop of the nation of the Britons who had been trained at Rome in the doctrine and discipline of the Western Church, and who built at Leukopibia (a town of Ptolemy's Novantæ, on the west side of Wigtown Bay, the modern Whithorn) a stone church, called Candida Casa, dedicated to St. Martin of Tours. He is said to have converted the Picts to the south of the Grampians. An old Irish account mentions that he spent his last years in Ireland, where he founded a church in Leinster.

NIOBE is a figure who appears in the legends of many parts of Greece, especially Thebes, Argos, and the Hermus valley. Proud of her numerous family, she scoffed at Leto as the mother of only two children. Apollo and Artemis, the children of Leto, slew all her children with their arrows; and Niobe, after vainly trying to defend them, wept over them till she became a rock which still weeps incessantly.

NIOBIUM, a very rare chemical element which was discovered by H. Rose, in 1846, as a component of the columbite of Bodenmais. In it, as also in tantalite, pyrochlore, yttrio-tantalite, and a few other rare minerals, it is constantly associated with tantalum, which was discovered by Ekkeberg, in 1802. Both metals, with vanadium, form a kind of appendage to the nitrogen group of elements. Like these they are capable of forming acid pentoxides and corresponding chlorides and oxychlorides.

NIORT, a city of France, chief town of the department of Deux Sèvres, distant 255 miles southwest of Paris, by the railway to Poitiers and La Rochelle (here crossed by the line from Angers to Angoulême), is situated at the head of navigation of the Sèvre Nior-taise, partly in the valley and partly on the slopes of the inclosing hills. The population of the city is 18,823, and that of the commune 22,254.

NIPPON. See JAPAN.

NISH, NISCH, or NISSA, the ancient Naissus, a city of the Balkan peninsula, which at one time was the capital of Servia, and after being the chief town of a Turkish eyalet in the vilayet of the Danube, and (1877) of the new vilayet of Kossovo, was again, in 1878, restored to Servia, where it is now the administrative center of a circle containing a population of 117,000. The town is a thriving place of 12,800 inhabitants, the see of a Greek bishop, the headquarters of a militia corps, and an important center in the Servian railway system.

NÍSHÁPÚR, or NÉSHÁPÚR, the most important city of Khorásán in the Middle Ages, but now much decayed. The second element of the name is that of the traditional founder, Shahpuhr or Sapor. Some accounts name the first, others the second Sapor. The older name of the town or district was Abrashahr. The importance of the place under the Susanians was in part religious; one of the three holiest fire-temples was in its neighborhood. Nishápúr under the Moslems contained a large Arab element; it became the capital of Khorásán, and greatly increased in prosperity, under the almost independent princes of the house of Táhir, (820-873 A.D.)

NISIBIS, a once famous city and fortress, situated in the north of Mesopotamia, near the point where the Jaghjagha leaves the mountains by a narrow defile. The modern Nasíbín consists of some 200 wretched huts, mainly inhabited by Jews, who pay tribute to the Shammar Bedouins.

NISI PRIUS. For the history and meaning of this term in English law see ASSIZE. As a rule actions only are tried at *nisi prius*, and a judge is said to sit at *nisi prius* when he sits alone, usually in the Queen's Bench Division, for the trial of actions.

NISSA. See NISH.

NITRATES, NITER, NITRIC ACID. See NITROGEN.

NITROGEN is a chemical element which, on account of its abundance in nature and its relations to life, is of great importance. About three-fourths of the mass of the atmosphere consists of elementary nitrogen; and, as an essential component of all albuminoids, the element pervades the whole of the animal kingdom. Nitrogen minerals are scarce (almost the only ones are Chili saltpeter and native niter), but traces of the two nitrogen compounds, ammonia and nitric acid, are diffused throughout all soils, besides existing in the atmosphere.

Elementary nitrogen exists only in the one form of nitrogen gas ($N_2 = 1$ molecule), which is easily extracted from the atmosphere. Though resembling air in its general properties, it is easily distinguished from it by its not supporting combustion.

Chemically, nitrogen gas is characterized by perfect inertness toward all ordinary reagents under ordinary conditions. But at certain higher temperatures boron, magnesium, vanadium, and titanium combine with it directly into nitrides. Nitrogen is capable of uniting even with ordinary oxygen. A mixture of the two gases, it is true, remains unchanged when exposed *en masse* to any temperature, but when it is subjected to a succession of electric sparks a small proportion of the two gases does unite into nitric oxide, which then combines with more oxygen into red fumes of peroxide.

The part which the nitrogen gas in the atmosphere plays in the economy of nature is as yet a mystery. It certainly is not susceptible of being taken up directly by the plants and utilized in their synthesis of nitrogenous compounds. It plays no active part in the processes of combustion and of animal respiration; in either it appears to act only as an inert diluent of the oxygen.

In the case of respiration, however, this particular diluent seems to be essential; no animal could live healthily for any considerable period of time in pure oxygen, and we know of no other diluent which could be substituted for the nitrogen without producing poisonous effects. There can be no doubt that atmospheric nitrogen, in an indirect way, contributes toward the building up of nitrogenous organic matter. Every process of ordinary combustion probably, and every electric discharge in the atmosphere certainly, induces the formation of some nitric acid, which by combining with

the atmospheric ammonia becomes nitrate of ammonia, and from certain experiments of Schönbein's it would appear that nitrogen gas and water are capable of uniting directly into nitrate of ammonia, which, supposing it to be produced in the atmosphere, would promptly be oxidized into nitrate. The nitrate produced by either process is carried down by the rain and conveyed to the roots of the plants, which assimilate it as a part of their nitrogenous organic matter. However small the scale may appear on which these processes of atmospheric nitrification go on when measured by the mass of nitrogen which remains unchanged, as this mass is immense, their absolute effect must be very considerable, and may form an important item in the economy of nature.

The compounds of nitrogen may be arranged under the heads of ammonia, nitrates, nitro-compounds, organic nitrogen compounds, and cyanides.

Ammonia, the only known compound of hydrogen, is a gas of the molecular formula NH_3 . The most convenient process for the preparation of the pure gas is to mix powdered sal-ammoniac with powdered quicklime in a flask and to heat the mixture in a sand-bath. Torrents of ammonia come off, which must be dried by passing it through a closely packed column of solid caustic potash or soda (chloride of calcium absorbs the gas chemically) and collected over mercury, as the gas dissolves most abundantly in water.

Aqueous ammonia (liquor ammoniæ), being in constant requisition as a reagent, and also used in medicine and in the arts, is being manufactured industrially. Aqueous ammonia is generally sent out as a "liquor fortissimus" of 30 to 35 per cent. For ordinary laboratory purposes it is usually diluted down to 9 to 10 per cent.

Two natural sources of ammonia are at present in industrial use. The gaseous exhalations of volcanoes always include ammonia, hydrochloric acid, and sulphurous acid, of which the first two are formed, no doubt, by the action of steam on deposits of nitrides and chlorides in the interior of the earth. This volcanic ammonia salt is highly valued as a material for the preparation of pure liquor ammoniæ; but its supply hardly comes up to the demands of even this small industry. More important are the masses of ammonia formed in the processes of putrefaction which are going on constantly in nature, and of which a mere fraction would satisfy all the demands of industry, if the recovery of such ammonia were not, as a rule, beset with insuperable difficulties. Thus, for instance, all the immense mass of the ammonia of the sewage of our large cities must be allowed to go to waste because we have no economical method for its extraction. Urine, when undiluted, is an easily handled raw material, and in former times actually formed the principal source of ammonia. Human urine contains from 2 to 3 per cent. of urea, or carbamide as it is called in systematic chemistry, because it is the anhydride of carbonate of ammonia. When urine putrefies, this carbamide takes up the elements of water and becomes carbonate of ammonia. A prompter mode of conversion is to evaporate the urine with a small proportion of vitriol, and heat the residue to near the boiling-point of the acid, when the nitrogen of the urea passes at once into the form of sulphate of ammonia. This latter process would apply also to the urine of horses and cattle, which, instead of urea, contain hippuric acid, a compound which, when taken conjointly with water, contains the elements of ammonia and benzoic and acetic acids. At the present time urine plays hardly any part in the ammonia industry; but it may be mentioned that the produce of the urinals of Glasgow is, or lately was, wrought for carbonate of ammonia.

Large quantities of tar-water are produced incidentally in the manufacture of coal-gas, and it is this material which at present forms the principal source for the industrial production of ammonia and ammonia salts. The tar-water obtained as a by-product in the distillation of shale for the production of paraffin oil is rich in ammonia, and is worked up for sulphate like gas-liquors.

Crude tar-water contains about 1 per cent. of ammonia (more or less according to the quality of coal used, and the way it has been manipulated), mostly in the form of carbonate, part as cyanide, sulphocyanate, and sulphide of ammonium; and this ammonia is associated with traces of hydrocarbons and other organic matter dissolved, or suspended, in the liquor. In some establishments the ammonia is extracted directly in the form of liquor ammoniac. The liquor is run into a large iron boiler, and, after addition of some ferrous and ferric salt, mixed with slaked lime and distilled. The vapors, if condensed as they come off, would yield a very dilute liquor and contaminated largely with volatile carbon compounds. To obtain a relatively pure gas, the vapor is subjected to a succession of partial condensations by making it pass through the several compartments of an iron apparatus similar in its action to the "Coffey's still" which is used for the strengthening and refining of alcoholic liquors (see DISTILLATION).

Of the several ammonia compounds, the sulphate is by far the most important in an industrial sense. Immense quantities of the crude salt are used as a manure—while to the technical chemist generally it serves as the most convenient starting-point for the manufacture of ammonia, or of other ammonia salts.

Nitrate of potash (saltpeter), which forms the predominating component of gunpowder, occurs native in India and other parts of the world, and such native niter has only to be purified by crystallization to become fit for the market. But the bulk of what occurs in commerce is made by double decomposition of Chili saltpeter with caustic potash, carbonate of potash, or chloride of potassium, which processes yield caustic soda, carbonate of soda, common salt as by-products. The third form of the method is most largely wrought, the necessary supplies of cheap chloride of potassium being furnished by the works at the Stassfurt deposits. A mixture of niter with charcoal, sulphur, or other combustible matter, when kindled, burns off with explosive violence. Hence its application for the manufacture of gunpowder and in pyrotechnics, and its use in the laboratory as a powerful oxidizing agent in operations of the dry way.

Nitric Acid, HNO_3 , is prepared from nitrate of potash or soda by distillation with sulphuric acid. The scientific chemist prefers the potash salt because it is more easily purified; the manufacturer uses nitrate of soda because it is cheaper and a lower temperature and a less excess of oil of vitriol suffice for its successful conversion into acid.

NITROGLYCERINE (synonyms *Glonoïn*, *Glonoïn Oil*, *Dynamites*, *Blasting Gelatine*), was discovered by Sobrero in 1846, and soon afterward was more thoroughly investigated by Railton and by De Vrij. It is formed by the action of concentrated nitric acid, in the presence of strong sulphuric acid, upon glycerine at a low temperature, and may be readily prepared upon a small scale by dropping the glycerine into the mixed acids, the mixture being kept artificially cooled, and afterward poured into a large volume of water. The nitroglycerine then separates as a heavy liquid, generally pale yellow, but quite colorless when pure. It is inodorous, and has a sweet, pungent, aromatic flavor; if it be touched with the tongue or even brought into

contact with the skin severe headache ensues, but this effect does not recur after awhile with those who habitually handle it, nor is their health permanently injured by working with it. Nitroglycerine is applied medicinally, in very minute doses, in cases of heart disease, but if taken even in small quantities it operates as a violent irritant poison. If a thin layer be spread upon a hard surface and struck sharply with a hammer it explodes violently; under favorable conditions it is more sensitive to explosion by a blow than even mercuric fulminate. It freezes (or crystallizes, in six-sided prisms) at about 40°F. , and slowly liquefies again at 50° . When frozen it is less sensitive to explosion; in the United States, where nitroglycerine is extensively used, as such, in mining operations, it is transported in the frozen state for greater safety. Under some circumstances, however, the readiness with which nitroglycerine and its preparations freeze is a source of danger; they have generally to be thawed, by applying heat, before use in cold weather or after they have been frozen for some time, and disastrous explosions have resulted from this being carelessly done. Nitroglycerine is very slightly soluble in water, but is readily taken up by many solvents, especially by methyl-alcohol or wood-spirit. This solution being non-explosive, in the early days of application of nitroglycerine it was transported in that form; but if the spirit became weakened by evaporation, an explosive layer of nitroglycerine containing some spirit would separate, and, in cold weather, nitroglycerine would crystallize out of the solution. The dangers attending the use of nitroglycerine were therefore not much diminished by the use of the solvent.

Unless very carefully freed from acid and from unstable impurities, nitroglycerine will decompose more or less rapidly, especially in warm climates, and the heat developed by the chemical change may lead to spontaneous explosions. But, when manufactured and purified according to the system originated and developed by Nobel, the liquid is possessed of great stability.

The first attempts to utilize the explosive power of nitroglycerine were made by Nobel in 1863; they were only partially successful until the plan, first applied by General Pictot in 1854, of developing the force of gunpowder in the most rapid manner and to the maximum extent, through the agency of an initiative detonation (see EXPLOSIVES), was applied by Nobel to the explosion of nitroglycerine. Even then, however, the liquid nature of the substance, though advantageous in one or two directions, constituted a serious obstacle to its safe transport and storage and to its efficient employment; it was therefore not until Nobel hit upon the expedient of producing plastic solid preparations by mixing the liquid with solid substances, in a fine state of division, capable of absorbing and retaining considerable quantities of it, that the future of nitroglycerine as one of the most effective and convenient blasting agents was secured. Charcoal was the first absorbent used; eventually the siliceous (infusorial) earth known as "kieselguhr" was selected by Nobel as the best material for producing DYNAMITE (*q.v.*), as it absorbs, after calcination, from three to four times its weight of nitroglycerine, and does not part with it easily when the mixture is submitted to pressure or frequent alterations of temperature. For work requiring the greatest sharpness and violence of action, the so-called No. 1 dynamite, consisting of about seventy-five parts of nitroglycerine and twenty-five parts of kieselguhr, is by far the most extensively used; other inert absorbents have been used at times, and numerous other less violent forms of dynamite are prepared by impregnating mixtures of oxidizable substances and oxidizing agents (*e.g.*, of nitrates and charcoal or carbonaceous bodies) with smaller pro-

portions of nitroglycerine, or by using imperfectly nitrified wood-fiber, or other forms of cellulose, as the absorbent. *Lithofracteur*, *dualin*, *glyoxilin*, *potentite*, *atlas-dynamite*, *liguin-dynamite*, are examples. The last-named was employed by the Fenians in the attempted outrages in Glasgow and London in 1883. The only inert absorbent of nitroglycerine which compares in efficiency with kieselguhr is *magnesia alba*, which is extensively used for making dynamite in California. The application of nitroglycerine preparations to industrial purposes, especially for mining, tunneling, and blasting work in which great cleaving and shattering effects are desired, has developed very rapidly since 1867. The most recent and most perfect form in which nitroglycerine is now used is called *blasting gelatine*. This material, also invented by Nobel, is composed of the liquid and of a small proportion of so-called nitro-cotton, which consists chiefly of those products of the action of nitric acid on cellulose which are intermediate between collodion-cotton and gun-cotton, (trinitro-cellulose, etc.) If the liquid is gently heated together with 5 to 7 per cent. of the finely-divided nitro-cotton, and the mixture kept stirred, the two gelatinize together, producing a translucent, plastic, and tenacious mass, which becomes hard when cooled to the freezing point of nitroglycerine, and may be kept in water for any length of time without an appreciable separation of nitroglycerine. When properly prepared, blasting gelatine is less sensitive to detonation than dynamite; and, while its action as an explosive is somewhat more gradual, it is considerably superior to dynamite in explosive power, and even slightly more powerful than pure nitroglycerine, the reason being that the latter contains somewhat more oxygen than is required for the complete oxidation of the carbon and hydrogen, and that this excess is utilized in supplying the deficiency of oxygen existing in the feebly explosive nitro-cotton. Blasting gelatine is rapidly replacing dynamite in some of its applications, and is already extensively manufactured in different countries.

NITZSCH, KARL IMMANUEL, theologian, was born at the small Saxon town of Borna on September 21, 1787, and died in 1868.

NIVELLES (Flem., *Nyvel*), a manufacturing town of South Brabant, Belgium, stands on the Thines, a small sub-tributary of the Scheldt, eighteen miles by rail to the south of Brussels. Population (1890), 10,000.

NIZÁMÍ. Shaikh Nizámí or Nizám-uddín Abú Mohammed Ilyás bin Yúsuf, the unrivaled master of the romantic epopee in Persia, who ranks in poetical genius as next to Firdausí, was born 535 A.H. (1141 A.D.) His claim to the title of the foremost Persian romanticist he fully established by the publication of his first epic masterpiece, *Khosrau* and *Shirín*, composed, according to the oldest copies, in 576 A.H. (1180 A.D.).

NIZAM'S DOMINIONS. See HYDERABAD.

NOAH is, according to the book of Genesis, the son of Lamech, and the second father of mankind after the deluge. His name, which is of obscure origin, is connected in Gen. v. 29 with a play on the word *nahem*, to comfort. The story of the flood, the two elements of which the extant narrative is composed, and the parallel traditions of other nations, particularly of the Babylonians, have been spoken of in the article DELUGE. The earlier narrative does not mention the point at which Noah left the ark, and it is doubtful if Gen. xi. 1 sq., which seems to be a fragment of a still older tradition, and which makes mankind disperse from Babylonia, originally stood in any connection with the story of Noah and the flood. The later priestly (or, as it used to be called, Elohist) narrative names the mountains of Ararat, *i.e.*, one of the mountains of the land of

Ararat, as the place where the ark rested. The identification of this mountain with the Ararat of modern maps (M. Masis) is tolerably old; Jerome already places the land of Ararat in this quarter; but a more ancient Jewish tradition, which remained alive throughout the Middle Ages, seeks Ararat in the land of Kardû, *i.e.*, the mountains of the Kurds east of the Tigris (comp. ARARAT). From the Bible it is only certain that the kingdom of Ararat was a remote northern district. After describing the covenant which God made with Noah on leaving the ark the priestly narrative has nothing further to tell of the patriarch's life; but an older fragment makes him plant a vineyard and drink of the wine with consequences which lead him to pronounce a blessing on Shem and Japheth and a curse of slavery on Canaan. The story seems to require, for clearness, the omission of the words "Ham, the father of" in verse 22; and if this be so we find that in one tradition the sons of Noah are Shem, Japheth, and Canaan. So taken, the names of the three sons would represent three elements, not in the population of the world, but in that of Palestine. Shem, in Hebrew, means name, and "sons of name," as opposed to "sons of no name," would naturally denote the Hebrew pure-blooded aristocracy, in antithesis to the subject aborigines (Canaan).

NOAILLES. This great French family took its name from the castle of Noailles, in the territory of Ayen, between Brives and Turenne, in Limousin, and dated its nobility from the eleventh century. It did not obtain more than local and provincial fame until the sixteenth century, when its head, Antoine de Noailles (1504-1562), became admiral of France, and was ambassador in England during three important years, 1553-1556, during which he maintained a gallant but unsuccessful rivalry with the Spanish ambassador, Simon Renard. Henri (1554-1623), son of Antoine, was a commander in the religious wars, and was made comte d'Ayen by Henry IV. in 1593. The grandson of the first count played an important part in the Fronde and the early years of the reign of Louis XIV., became a captain-general of the newly-won province of Roussillon, and in 1663 was made duc d'Ayen, and peer of France. The sons of the first duke raised the family to its greatest fame, and occupied very important positions in the later years of the reign of Louis XIV. The elder son of Anne Jules (1650-1708), was one of the chief generals of France toward the end of the reign of Louis, and, after raising the regiment of Noailles in 1689, he commanded in chief in Spain during the war of the Spanish succession, and was made marshal of France in 1693. The younger son, Louis Antoine (1651-1729), took orders, and rose to the most important position of the church in France when he was made archbishop of Paris in 1695. He held his high dignity for more than thirty years, until his death in 1729; he was made a cardinal in 1700. These two distinguished brothers had made their family the most famous in France, with the exception of the Rohans, and the name occurs with almost confusing reiteration throughout the eighteenth century. Adrien Maurice (1678-1766), the third duke, was also a soldier, and learned war under his family in Spain. He served in all the most important wars of the reign of Louis XV. in Italy and Germany, and became the second *maréchal* de Noailles in 1734. His last command in the war of the Austrian succession was not a successful one, for he was beaten by the English at the battle of Dettingen in 1743. Two sons of the third duke also attained the rank of marshal of France. The elder, Louis (1713-1793), who bore the title of duc d'Ayen till his father's death in 1766, when he became duc de Noailles, served

in most of the wars of the eighteenth century without particular distinction, but was nevertheless made a marshal of France, as the *maréchal de Noailles*, in 1775. On the fourth Thermidor, just before the fall of Robespierre, the aged duchesse de Noailles was executed with her daughter-in-law, the duchesse d'Ayen, and her granddaughter, the vicomtesse de Noailles. Jean Paul François (1739-1824), the fifth duke, was, like his family, in the army, but his heart was bent on scientific pursuits, and for his eminence as a chemist he was elected a member of the Academy of Sciences in 1777. He became duc d'Ayen in 1766 on his grandfather's death, and duc de Noailles on his father's in 1793. Having emigrated in 1792, he lived in Switzerland until the restoration in 1814, when he took his seat as a peer of France. He had no son, but several daughters, one of whom married La Fayette, and another her cousin, the vicomte de Noailles. He was succeeded as duc de Noailles by his grandnephew, Paul (b. 1802), who has won some reputation as an author, and who became a member of the French Academy in the place of Chateaubriand in 1849. The grandfather of Paul de Noailles, and brother of the fifth duke, Emmanuel Marie Louis (1743-1822), *marquis de Noailles*, was a distinguished diplomatist of the eighteenth century, he was ambassador at Amsterdam from 1770-1776, at London, 1776-1783, and at Vienna, 1783-1792; and, like his brother, he survived the Revolution, and lived to see the Restoration.

One other branch of the family deserves notice. PHILIPPE (1715-1794), *comte de Noailles*, was a younger brother of the fourth duke, and a more distinguished soldier than his brother. He served at Minden and in other campaigns, and was made a marshal on the same day as his brother, under the title of *maréchal de Mouchy*. He was long in great favor at court, and his wife was first lady of honor to Marie Antoinette, and was nicknamed by her *Madame Etiquette*. This court favor brought down punishment in the days of the Revolution, and the old marshal and his wife were guillotined on June 27, 1794. His two sons, the prince de Poix and the vicomte de Noailles, were both members of the Constituent Assembly. LOUIS MARIE (1756-1804), *vicomte de Noailles*, was the second son of the *maréchal de Mouchy*, and the most distinguished of his family. He served brilliantly under his brother-in-law La Fayette in America, and was the officer who concluded the capitulation of Yorktown. He was elected to the states-general in 1789, and at once showed his enthusiasm for liberty. He began the famous "orgie," as Mirabeau called it, on August 4, when all privileges were abolished, and with d'Aiguillon proposed the abolition of titles and liveries in June, 1790. When the Revolution became more pronounced he emigrated to America, and became a partner in Bingham's bank at Philadelphia. He accepted a command against the English in San Domingo, under Rochambeau. He made a brilliant defense of the mole St. Nicholas, and escaped with the garrison to Cuba; but in making for Havana his ship was attacked by an English frigate, and after a long engagement he was severely wounded, and died of his wounds on January 9, 1804. The whole family of Noailles had not a more brilliant representative than the friend of La Fayette, Louis, *vicomte de Noailles*.

NOÁKHÁLÍ, or NOACOLLY, a district in the lieutenant-governorship of Bengal, India, with an area of 1,641 square miles, consists of an alluvial tract of mainland, together with several islands at the mouth of the Meghná. The population of the district was 820,772 in 1881, of whom 608,592 were Mohammedans.

NOBILI, LEOPOLDO, born in 1784, became professor

of physics in the archducal museum at Florence. His most valuable contributions to science consist in the suggestion of the astatic combination of two needles by which the sensibility of a galvanometer is so greatly increased, and in the invention of the so-called thermo-multiplier or thermo-electric pile. His own experimental work with these instruments was soon eclipsed by the brilliant applications made of them by Melloni and Forbes. He died in 1834.

NOBILITY. Aristocracy implies the existence of nobility; but nobility does not imply aristocracy; it may exist under any form of government. The peerage, as it exists in the three British kingdoms, is something which is altogether peculiar to them, and which has nothing in the least degree like it elsewhere.

Nobility, in the strict sense of the word, is the hereditary handing on from generation to generation of some acknowledged preëminence, a preëminence founded on hereditary succession, and on nothing else. Such nobility may be immemorial or it may not. There may or there may not be a power vested somewhere of conferring nobility; but it is essential to the true idea of nobility that, when once acquired, it shall go on forever to all the descendants—or, more commonly, only to all the descendants in the male line—of the person first ennobled or first recorded as noble. The preëminence so handed on may be of any kind, from substantial political power to mere social respect and precedence. It does not seem necessary that it should be formally enacted by law if it is universally acknowledged by usage. It may be marked by titles or it may not. It is hardly needful to prove that nobility does not imply wealth, though nobility without wealth runs some risk of being forgotten. This definition seems to take in all the kinds of nobility which have existed in different times and places. They have differed widely in the origin of the noble class and in the amount of privilege implied in membership of it; but they all agree in the transmission of some privilege or other to all the descendants, or to all the male descendants, of the first noble.

In strictness nobility and gentry are the same thing. This fact is overshadowed in England, partly by the habitual use of the word "gentleman" in various secondary uses, partly by the prevalent confusion between nobility and peerage. But that they are the same is proved by the use of the French word *gentilhomme*, a word which has pretty well passed out of modern use, but which, as long as it remained in use, never lost its true meaning. There were very wide distinctions within the French *noblesse*, but they all formed one privileged class as distinguished from the *roturier*. Here, then, is a nobility in the strictest sense. If there is no such class in England, it is simply because the class which answers to it has never been able to keep any universally acknowledged privileges. The word "gentleman" has lost its original meaning in a variety of other uses, while the word "nobleman" has come to be confined to members of the peerage and a few of their immediate descendants.

That the English peerage does not answer to the true idea of a nobility will be seen with a very little thought. There is no handing on of privilege or preëminence to perpetual generations. The peer holds a great position endowed with substantial powers and privileges, and those powers and privileges are handed on by hereditary succession. But they are handed on only to one member of the family at a time. The peer's children, in some cases his grandchildren, have titles and precedence, but they have no substantial privileges. His remoter descendants have no advantage of any kind over other people, except their chance of succeeding to the peerage. The remote descendant of a duke, even

though he may chance to be heir presumptive to the dukedom, is in no way distinguished from any other gentleman; it is even possible that he may not hold the social rank of gentleman. This is not nobility as nobility was understood either in the French kingdom or in the Venetian commonwealth.

The tendency of modern times has been toward the breaking down of formal hereditary privileges. In modern commonwealths, above all, they have been thought to be essentially inconsistent with republican institutions. The truth of the matter is rather that the circumstances of most modern commonwealths have been unfavorable to the preservation, and still more to the growth, of privileged bodies. Where they existed, as in Switzerland, they have been overthrown. Where they did not exist, as in America, everything has made it more and more impossible that they should arise. And, as modern changes have commonly attacked the power both of kings and of nobles, the common notion has come that kingship and nobility have some necessary connection. It has seemed as if any form of nobility was inconsistent with a republican form of government, while nobility in some shape or other, has come to be looked on as a natural, if not a necessary, appendage to a monarchy. And as far as regards the social side of kingship this is true. A court seems more natural where a chain of degrees leads gradually up from the lowest subject to the throne than when all beneath the throne are nearly on a level. And from one point of view, that from which the kingly house is but the noblest of the noble, kingship and nobility are closely allied. But in the more strictly political view monarchy and nobility are strongly opposed. Even the modified form of absolute monarchy which has existed in some Western countries, while it preserves, perhaps even strengthens, the social position of a nobility, destroys its political power. Under the fully developed despotisms of the East a real nobility is impossible; the prince raises and thrusts down as he pleases. It is only in a commonwealth that the nobility can really rule; that is, it is only in a commonwealth that the nobility can really be an aristocracy. And even in a democratic commonwealth the sentiment of nobility may exist, though all legal privilege has been abolished, or has never existed. That is to say, traditional feeling may give the members of certain families a strong preference, to say the least, in election to office. We have seen that this was the case at Athens; it was largely the case in the democratic cantons of Switzerland; indeed the nobility of Rome itself, after the privileges of the patricians were abolished, rested on no other foundation.

NOCERA INFERIORE, formerly NOCERA DEI PAGANI, a city of Italy, in the province of Salerno. It had a communal population of 15,858, that of the town is 12,830; but the interest of the place is almost exclusively historical.

NODDY, the name applied, originally by sailors, to a sea-bird from its showing so little fear of man as to be accounted stupid. It is the *Sterna stolidus* of Linnæus, and the *Anous stolidus* of modern ornithology, having the figure of a TERN (*q.v.*), and belonging to the sub-family *Sterninae*, but is heavier in flight, with shorter wings and the tail less deeply forked. The plumage is of a uniform sooty hue, excepting the crown of the head, which is light gray. The Noddy is very generally distributed throughout the tropical or nearly tropical oceans, but occasionally wanders into colder climates, and has been met with even in the Irish Sea. It breeds, often in astounding numbers, on low cays and coral-islets, commonly making a shallow nest of seaweed or small twigs, which may be placed on the

ground, on a tuft of grass, or in the fork of a tree, while sometimes it lays its eggs on a bare rock.

NODIER, CHARLES, a writer of greater intrinsic merit and more importance in the history of French literature than is generally recognized, was born at Besançon somewhat less than ten years before the outbreak of the Revolution, but the exact date is strangely uncertain. Besançon for the place and April 29th for the day of the month appear to be agreed upon, but the year is sometimes given as 1780, sometimes as 1781, and sometimes as 1783. Having obtained and then lost the post of librarian in his native town, he went to Paris and plunged into literature. He had published a dissertation on the antennæ in insects as early as 1798, at Besançon. Entomology continued to be a favorite study with him, but he varied it with philology and pure literature—*La Peintre de Salzbourg* dates from this early period—and even political writing. A "skit" on Napoleon, in 1803, got him into trouble, which was not very serious. He was obliged, or thought himself obliged, to quit Paris, and for some years lived a very unsettled life at Besançon, Dôle, and other places. In 1811 he appears at Laibach in the singular character of editor of a polyglot journal, the *Illyrian Telegraph*, published in French, German, Italian, and Slav. Then he returned to Paris, and the restoration found him, or made him, an ardent royalist. Literary and journalistic work of all kinds filled up his time until, in 1823, he was appointed to the librarianship of the Bibliothèque de l'Arsenal. He was not disturbed in this post by the revolution of July, but, on the contrary, was elected a member of the Academy in 1833, and made a member of the Legion of Honor in 1843, a year before his death, which happened on January 27, 1844.

NOETUS, a presbyter of the church of Asia Minor about 230 A.D., was a native of Smyrna, where (or perhaps in Ephesus) he became a prominent representative of the particular type of Christology which is now technically called modalistic monarchianism. His views, which led to his excommunication from the Asiatic church, are known to us chiefly through the controversial writings of Hippolytus, his contemporary.

NOIRMOUTIER, an island of France belonging to the department of Vendée, and protecting the bay of Bourgneuf on the southwest. The area amounts to eighteen square miles, of which about a sixth part is occupied by dunes. The total population is 7,726.

NOLA, a city of Italy in the province of Caserta (Terra di Lavoro), is pleasantly situated on the plain between Mount Vesuvius and the Apennines, fourteen miles east-northeast of Naples on the road to Avellino, and twenty and a half miles southwest of Cancelli on the railway to the same town. The population of the city was 10,771 in 1871, and 8,489 in 1881; that of the commune 11,395 in 1871, and 11,931 in 1881.

NOLLEKENS, JOSEPH, sculptor, was born August 11, 1737, in London, where his father, a native of Antwerp, the "old Nollekens" of Horace Walpole, was a painter of some repute. In his thirteenth year he entered the studio of the sculptor Scheemakers, and practiced drawing and modeling with great assiduity, ultimately gaining various prizes offered by the Society of Arts. In 1760 he went to Rome, and he executed a marble bas-relief, *Timoclea before Alexander*, which obtained a prize of fifty guineas from that society in 1762. Having returned to England in 1770, he was admitted an associate of the Royal Academy in 1771, and elected a member in the following year. The most prominent personal characteristic of Nollekens seems to have been his frugality, which ultimately developed into absolute miserliness. He died in London, April 23, 1823.

NOLLE PROSEQUI (sometimes shortened into *nol. pros.*) is a technical term of law, the meaning of which varies as it is used with reference to civil or criminal cases. In civil cases it applies only to actions, and there signifies a formal undertaking by the plaintiff that he will proceed no further with the action. The more modern practice in such cases is to proceed by way of discontinuance. In proceedings either by indictment or by information, a *nolle prosequi* or stay of proceedings may be entered by the attorney-general.

In America the term bears the same meaning as in England, with one exception. The attorney-general has not the same discretion with which English law invests him. Although in some States the prosecuting officer may enter a *nolle prosequi* at his discretion, in others the leave of the court must be obtained.

NOLLET, JEAN ANTOINE, French physicist, was born at Pimpréz (now in Oise), November 19, 1700, and died at Paris in 1770.

NOMANSLAND. See **KAFFRARIA**.

NOMINALISM. See **SCHOLASTIC PHILOSOPHY**.

NONCONFORMITY. The history of the gradual relief of nonconformists in England from their disabilities will be found under **ENGLAND**, and under the heads of the various denominations, *e.g.*, **BAPTISTS**, **INDEPENDENTS**, **METHODISM**, **QUAKERS**, etc. See also **OATHS**.

NONJURORS in English history are the small minority of the beneficed clergy who incurred the penalties of suspension and deprivation for refusing to swear allegiance to William and Mary in 1689. The party, which was headed by Archbishop Sancroft and Bishop Ken, with five other members of the episcopal bench, included such men as Jeremy Collier, George Hickes, William Sherlock, Charles Leslie, and Henry Dodwell. (See **ENGLAND**.)

NONNUS, Greek epic poet, author of the *Dionysiaca*, was a native of Panopolis, in the Egyptian Thebaid. He can scarcely have been earlier than the fifth century of our era, but probably wrote in the first half of it, as his versification is imitated by Proclus, who was born 412 A.D. Nothing is known of his personal history, but his extensive mythological erudition almost proves him to have been a grammarian.

NONPAREIL, the name under which, from its supposed matchless beauty, a little cage-bird, chiefly imported from New Orleans, has long been known to dealers. It is the *Emberiza ciris* of Linnæus, and the *Cyanospiza ciris* of most recent ornithologists, belonging to a small group, which, in the present state of knowledge, cannot with certainty be referred either to the buntings or to the finches, while some authors have regarded it as a **TANAGER**, (*q.v.*) The cock has the head, neck, and lesser wing-coverts bright blue, the upper part of the back yellow, deepening into green, and the lower parts generally, together with the rump, bright scarlet, tinged on the latter with purple. This gorgeous coloring is not assumed until the bird is at least two years old. The hen is green above and yellow beneath; and the younger cocks present an appearance intermediate between the adults of both sexes. The species, which is often also called the Painted Bunting, after wintering in Central America or Mexico, arrives in the southern States of the American Union in April, but does not ordinarily proceed to the northward of South Carolina. In Louisiana, where it is generally known to the French-speaking inhabitants as the *Pape*—as it was to the Spaniards of Florida as the *Mariposa pintada* (painted butterfly)—it is abundant. Belonging to the same genus as the Nonpareil is the indigo bird, *Cyanospiza cyanea*, which, as a summer visitant, is widely diffused from the Missouri to the

Atlantic, and extends into the provinces of Ontario and New Brunswick.

NONSUIT (*i.e.*, *non suit*, he does not pursue) is the name given to a judgment whereby an issue is determined against the plaintiff. It was a term peculiar to the English common-law courts before the Judicature Acts, and was simply the expression of the opinion of the court that, apart from the merits, the plaintiff's case was incomplete. It did not in any way act as a bar to his bringing another action for the same cause.

NOODT, GERHARD, a celebrated jurist, was born at Nimeguen in 1647. He began his studies in his native town, continued them at Leyden and Utrecht, and finished them at Franeker, where he took his doctor's degree in law; after passing through successive grades of promotion he was ultimately appointed to a law chair at Leyden. It was in the character of a writer on jurisprudence, however, that he acquired his reputation. He died in 1725.

NORD, the most northern of the departments of France, formed out of Flanders, French Hainault, and the district of Cambrais (Cambrésis), has a length from southeast to northwest of 112 miles, while its breadth is nowhere more than forty miles, and contracts to four at the point where it is crossed by the Lys. Bounded northwest and north for twenty-one miles by the North Sea, it has the Belgian provinces of West Flanders and Hainault on the northeast and east, the departments of Aisne and Somme on the south, and that of Pas-de-Calais on the west. The climate of Nord is colder than that of France in general, the mean temperature being 49° or 50° Fahr. The rainfall is twelve inches at Dunkirk and a little more at Lille. In the arrondissement of Avesnes, rain is more abundant, and cold more severe. In population (1,603,259 inhabitants) and in agricultural and industrial importance Nord is second only to the department of the Seine.

Of the total area (2,193 square miles), two-thirds are arable, one-sixth under pasture, and one-eleventh consists of forest. The grain crops yield about 19,250,000 bushels, potatoes about half as much. Beetroot, flax, tobacco, chicory, colza, rapeseed, and hops are all of importance. The natural pastures support a good breed of Flemish cows. Stone, marble, clay, and sand are obtained in the department; but its mineral wealth lies rather in its coal-pits. Iron-mines also are worked in the arrondissement of Avesnes. The best mineral waters are those of St. Amand. There are numerous foundries, rolling-mills, steelworks, fileworks, agricultural-implement manufactories, and engineering-works. More than 240,000 tons of pig-iron and 279,000 tons of malleable iron, cast-iron, rails, sheet-iron, and Bessemer steel were produced in 1881. Consuming 4,500,000 tons of coal, it has to supplement its own production by importing from Pas de Calais, Belgium, or England. Most of the foreign trade passes through Dunkirk, a much larger port than Gravelines. Abundant means of transit exist throughout the department. The total length of the navigable rivers and canals is 325 miles, and railways to a total length of 450 miles have been constructed between all the most important localities.

Nord forms the archiepiscopal diocese of Cambrai, is comprised in the first or Lille region of *corps d'armée*, and depends on the court of appeal at Douai. It is divided into 7 arrondissements, 61 cantons, and 663 communes. The number of communes of importance especially for their industries is very large.

NORDERNEY (*i.e.*, northern island), the most important of the fringe of sand-islands along the coast of East Friesland, belongs to the Prussian province of Hanover. It is eight miles long and about one mile

broad, and supports a seafaring and fishing population of 2,114, of genuine old Frisian stock.

NORDHAUSEN, a flourishing town in Prussian Saxony, in the district of Erfurt, is situated on the Zorge, at the south base of the Harz mountains, and at the west end of the Goldene Aue (Golden Plain), a fruitful valley watered by the Helme. The chief importance of the place arises from its distilleries, which yearly produce about 8,000,000 gallons of brandy. The breweries are also important, and there are manufactures of leather, tobacco, cotton and linen goods, carpets, chicory, and chemicals. Population (1890), 26,198.

NÖRDLINGEN, a town of West Bavaria, in the district of Schwaben und Neuburg, is situated on the Eger, forty miles to the north of Augsburg. Population, 8,000.

NORFOLK, an eastern maritime county in England, is bounded north and east by the North Sea, south-east and south by Suffolk, southwest by Cambridge, and west by Lincoln. It is of an irregular oval form, its greatest length east and west being sixty-seven miles, and its greatest breadth about forty-two miles. The area is 1,356,173 acres, or 2,119 square miles.

Nearly two-thirds of the boundary of the county is formed by tidal water. There are few bays or inlets, and on the northern coast no river mouths. For the most part the coast-line is flat and low and has been greatly encroached on by the sea, several villages having been engulfed since the time of William the Conqueror. The surface is principally an undulating plain with rising ground skirting the river valleys and low chalk downs in the north and northwest. The principal rivers are the Yare, in the east, with its tributaries, the Bure, the Wensum, and the Waveney; and the Ouse, in the west, with its tributaries, the Little Ouse, the Wissey, and the Nar. Nearly the whole of Norfolk is occupied by chalk, but on account of drift deposits it forms a comparatively small proportion of its surface.

On account of the exposed position of the coast to east and northeast winds, the climate, especially in winter and early spring, is much colder than in the adjacent counties. The air is, however, generally dry, and unhealthy fogs are not common, except in the marshy districts. Norfolk contains a greater variety of soil than any other county in England. According to the agricultural returns of 1883, the area of cultivation was 1,087,270 acres—a percentage of about eighty of the total area.

At an early period Norfolk was one of the principal seats of the cloth trade in England, worsted deriving its name from having been first manufactured at Worstead. The weaving of silk and wool is still carried on at Norwich, and also shawl weaving, although the staple trade of the town is now boots and shoes. Silk is also manufactured at Yarmouth, Wymondham, and North Walsham. The population in 1881 was 444,749, of whom 215,266 were males and 229,483 females.

NORFOLK, a city and port of entry of the United States, in Norfolk county, Va., opposite Portsmouth, on the north bank of the Elizabeth river, an arm of Chesapeake Bay. It is the terminus of the Norfolk and Western Railroad (408 miles) and the Norfolk Southern Railroad (74 miles), has easy access to the Dismal Swamp Canal (from Elizabeth City to the Pasquotank river), and the Albemarle and Chesapeake Canal, navigable for vessels of 500 tons, and is connected by regular lines of steamers with Richmond, Baltimore, Philadelphia, Boston, Providence, Washington, and New York. The city lies low, and is somewhat irregular in its arrangement, but the streets are generally wide. The city hall, with a cupola 110 feet high, the custom-house and postoffice, the Norfolk academy, the masonic

temple, the mechanics' hall, and some of the banks are the most conspicuous of the secular buildings.

Norfolk is the seat of the United States navy-yard, one of the largest in the country. It is one of the most important cotton markets of the United States, and its annual receipts were 500,308 bales; total direct exports, 235,622 bales; domestic shipments, 263,360 bales; value of direct exports, \$10,938,162. The total value of all exports was \$12,381,122. Norfolk has a bonded debt of \$2,520,898; the annual receipts of the city treasury (1889) were \$546,706; expenditures, \$505,409. The total assessed valuation was \$15,210,805; rate of taxation, \$1.77 on the \$100. There is a police force of forty-six men, costing \$36,000, and a fire department maintained at a cost of \$19,000. The population of school age numbers 7,430; school enrollment, 2,860; cost of schools, \$22,541. There are seven school buildings, and the school property is valued at \$73,850. Population (1890), 34,871.

Founded in 1705, Norfolk was incorporated as a borough in 1736, and as a city in 1845. In 1776 it was burned by the British. At the opening of the Civil War it was the chief naval depot of the Confederates, but at an early date in the contest the vessels and yard were destroyed, and in May, 1862, the town was occupied by the Federal forces.

NORFOLK ISLAND, with the much smaller Nepean Island and Phillip Island, lies about 400 miles north-northwest of New Zealand, on a submarine tableland extending eighteen miles to the north, and twenty-five miles to the south, with an average breadth of eighteen miles. Measuring about six miles in length from northwest to southeast, Norfolk Island has an area of 8,607 acres, or thirteen and one-half square miles. The breakers of the Pacific beating on its high cliff-bound coast render it difficult or even impossible to land except at two places, and even there not without danger. The climate is genial and healthy, the thermometer rarely sinking below 65°. In 1862 the population was 268; in 1871, 481; and in 1880, 663. The descendants of the Pitcairn Islanders, who form two-thirds of the inhabitants, have their chief settlement on the south side, on Sydney Bay, where the buildings of the old penal establishment were placed at their disposal. A thousand acres on the west side of the island are held by the mission station of St. Barnabas, founded by Bishop Patteson, where 150 Melanesian boys and girls receive education.

NORICUM was the ancient name of the country south of the Danube, around the rivers Inn and Drave, and extending on the south to the banks of the Save. The original population appears to have been Illyrian, but in the great emigration of the Gauls the country was occupied by a Celtic people, Taurisci or Norici.

NORMANBY, CONSTANTINE HENRY PHIPPS, MARQUIS OF, bore an eminent, though not a leading, part in some of the greatest movements of this century. As governor of Jamaica he had charge of the distribution of the huge compensation to owners upon the abolition of slavery in the West Indies; it fell to him as lord-lieutenant of Ireland to give effect to the Catholic Emancipation Act; he was English ambassador at Paris during the revolution of 1848, and minister in Tuscany in the years immediately preceding the struggle for Italian unity. The son of the first earl Mulgrave, and born May 15, 1797, he passed through Harrow and Trinity College, Cambridge, and sat for the family borough of Scarborough as soon as he attained his majority. Lord Normanby reached the zenith of his career between the age of thirty and forty; after that he began to lag and to decline in political reputation. He succeeded his father as Earl Mulgrave in 1831, was sent

out as captain-general and governor of Jamaica in the same year, and, in spite of certain defects of manner, gained such credit as an administrator that he was appointed lord-lieutenant of Ireland in 1835. He was created marquis of Normanby in 1838, and held successively the offices of colonial secretary and home secretary in the last years of Lord Melbourne's ministry. From 1846 to 1852 he was ambassador at Paris, and from 1854 to 1858 minister at Florence. He died in London, July 28, 1863.

NORMANDY is the name which was given to part of northern Gaul in consequence of its occupation in the early part of the tenth century by the Northmen, whose name was on Gaulish soil gradually changed into Normans. Till that time the land which has ever since borne the name of Normandy had no distinct name, nor any separate political being. In ecclesiastical geography it answers very nearly, but not quite exactly, to the province of Rouen. Politically it was, at the time of the Scandinavian settlement, part of the great duchy of France, of which it took in nearly the whole of the seacoast.

Normandy, in its widest extent, reached on the eastern side to the rivers Eu and Epte, of which the Eu empties itself into the English Channel near the town of that name, while the Epte flows in the opposite direction and joins the Seine near Vernon.

But the main feature of the country is its seacoast and great river. A glance at the map will show that the coast of Normandy, long as it seems, is little more than the mouth of the Seine. To the west that mouth is guarded by the peninsula of Coutances, the Danish land which, it has been remarked, is the only peninsula in Europe, besides the older Danish land, which points to the north. To the west this peninsula presents a bold front to the Atlantic, forming with the Breton coast a bay in which lie the Norman islands, Jersey, Guernsey, Alderney, Sark, and some smaller ones. Normandy, in fact, was the seaboard of France in the strict sense, the coast lying between Brittany on the one side and Flanders on the other. It is that part of the Continent which lies most directly opposite Britain. The Norman duchy, in short, as long as it had an independent being, was interposed between England and France; and in that position lies the key to its whole history.

The chief city of the duchy was always the ecclesiastical metropolis of Rouen (*Rothomagus*), the great city of the lower Seine.

In the divisions of modern France, Normandy answers to the departments of Lower Seine (cap. Rouen), Eure (cap. Evreux), Orne (cap. Alençon), Calvados (cap. Caen), Manche (cap. St. Lo), and to the modern dioceses of Rouen, Evreux, Séez, Bayeux, and Coutances. The boundaries of Rouen and Evreux have been changed; Lisieux has been joined to Bayeux, and Avranches to Coutances. The archbishop of Rouen still keeps the title of primate of Normandy; otherwise the name of the duchy has gone out of formal use.

NORMANS is the softened form of the word "Northman," applied first to the people of Scandinavia in general, and afterward specially to the people of Norway. In the form of "Norman" (*Northmannus*, *Normannus*, *Normand*) it is the name of those colonists from Scandinavia who settled themselves in Gaul, who founded the Norman duchy, who adopted the French tongue and French manners, and who from their new home set forth on new errands of conquest, chiefly in the British Islands and in southern Italy and Sicily. From one point of view the expeditions of the Normans may be looked on as continuations of the expeditions of the Northmen. As the name is etymologically the same, so the people are by descent the

same, and they are still led by the old spirit of war and adventure.

NORMANTOWN, a township in the West Riding of Yorkshire, England, is situated on the Calder river, and on several railway lines. Population, 8,000.

NORRIS, JOHN, was born in 1657 at Collingbourne-Kingston, in Wiltshire, where his father was then incumbent. He was educated at Winchester School, and entered at Exeter College, Oxford, in 1676. In 1680 he took his degree and was elected to a fellowship at All Souls' College. He first made himself known in the university, Anthony Wood tells us, by a translation of Robert Waryng's philosophical poem, *Effigies Amoris*, entitled *The Picture of Love Unveiled*. This appeared in 1682, and was followed in 1683 by his first original work, *An Idea of Happiness*.

In 1691 Norris was transferred to Bemerton, a pleasant rural charge near Salisbury, where George Herbert had been parish priest in the earlier part of the century. A few miles distant is Langford Magna, where from 1704 onward Norris had a congenial metaphysical neighbor in the person of Arthur Collier, the future author of *Clavis Universalis*. The remaining twenty years of Norris' life were spent at Bemerton, the flight of time marked only by the works that still came in rapid succession from his pen. He died in 1711.

NORRISTOWN, capital of Montgomery county, Penn., lies on the north bank of the Schuylkill river, opposite Bridgeport (with which it is connected by two bridges), and sixteen miles northwest of Philadelphia by the Germantown and Norristown branch of the Philadelphia and Reading Railroad. It is a well-built and pleasant town, and contains blast-furnaces and rolling-mills, wool and cotton mills, glassworks, an oil refinery, and various other manufacturing establishments, considerably indebted for their success to the water-power of the Schuylkill river. The hospital for the insane of the southeastern district of Pennsylvania is situated here. The most conspicuous buildings are the marble county courthouse (1855), the music-hall, and the jail. The population was 6,024 in 1850, 8,848 in 1860, 10,753 in 1870, 13,063 in 1880, and 19,791 in 1889. The town occupies the site of the old Swedes' Ford, and owes its name to Isaac Norris, who purchased the ground from William Penn. It was incorporated as a borough in 1812, and enlarged in 1853.

NORRKÖPING, the "Manchester of Scandinavia," a town of Sweden in the province of Östergötland, 113 miles southwest of Stockholm by rail. Having been burned by the Russians in 1719 and visited by further conflagration in 1812, 1822, and 1826, the whole town, since rebuilt, has quite a modern appearance, with wide and regular streets. Steamers, gunboats, and iron-clads, as well as smaller craft, are constructed in the shipyard on the lower Motala. At the close of the seventeenth century Norrköping was a place of from 5,000 to 5,000 inhabitants; after the Russian invasion it sank to 2,600, but afterward gradually rose, until in 1861 the total amounted to 20,828, and in 1888 to 27,410.

NORTH, LORD. Frederick North, second earl of Guilford, but better known by his courtesy title of Lord North, was prime minister of England during the important years of the American War. The only son, by his first marriage, of Francis, seventh Lord North (grandson of Lord Keeper North), who was created earl of Guilford in 1752, Frederick was born on April 13, 1732, and, after being educated at Eton and Christ Church, Oxford, was sent to make a grand tour of the Continent. On his return he was, though only twenty-two years of age, at once elected M.P. for Banbury, of which town his father was high steward; and he sat for the same town in parliament for nearly

forty years. In 1759 he was chosen by the duke of Newcastle to be a lord of the treasury, and continued in the same office under Lord Bute and George Grenville till 1765. He had shown himself such a ready debater that on the fall of the first Rockingham ministry in 1766 he was sworn of the privy council, and made paymaster-general by the duke of Grafton. His reputation for ability grew so high that in December, 1767, on the death of the brilliant Charles Townshend, he was made chancellor of the exchequer. His popularity with both the House of Commons and the people continued to increase, for his good temper was never ruffled, and his quiet humor was perpetually displayed; and, when the retirement of the duke of Grafton was necessitated by the hatred he inspired and the attacks of Junius, no better successor could be found for the premiership than the chancellor of the exchequer. Lord North succeeded the duke in March, 1770, and continued in office for twelve of the most eventful years in English history. George III. had at last overthrown the ascendancy of the great Whig families, under which he had so long groaned, and determined to govern as well as rule. He knew that he could only govern by obtaining a majority in parliament to carry out his wishes, and this he had at last obtained by a great expenditure of money in buying seats, and by a careful exercise of his patronage. But in addition to a majority he must have a minister who would consent to act as his lieutenant, and such a minister he found in Lord North. How a man of undoubted ability such as Lord North was could allow himself to be thus used as a mere instrument cannot be explained; but the confidential tone of the king's letters seems to show that there was an unusual intimacy between them, which may account for North's compliance. The path of the minister in parliament was a hard one; he had to defend measures which he had not designed, and of which he had not approved, and this, too, in a House of Commons in which all the oratorical ability of Burke and Fox was against him, and when he had only the purchased help of Thurlow and Wedderburne to aid him. The most important events of his ministry were those of the American War of Independence. One of his first acts was the retention of the tea-duty, and he it was also who introduced the Boston Port Bill in 1774. When the war had broken out he earnestly counseled peace, and it was only the earnest solicitations of the king not to leave his sovereign again at the mercy of the Whigs that induced him to defend a war which from 1779 he knew to be both hopeless and impolitic. At last, in March, 1782, he insisted on resigning after the news of Cornwallis' surrender at Yorktown. He had been well rewarded for his assistance to the king; his children had good sinecures; his half-brother, Brownlow North, was bishop of Winchester; he himself was chancellor of the university of Oxford, lord-lieutenant of the county of Somerset, and had finally been made a knight of the Garter, an honor which has only been conferred on three other members of the House of Commons, Sir R. Walpole, Lord Castlereagh, and Lord Palmerston. Lord North did not remain long out of office, but in April, 1783, formed his famous coalition with his old antagonist, Fox, and became secretary of state with him under the nominal premiership of the duke of Portland. He was probably urged to this coalition with his old opponent by a desire to show that he could act independently of the king, and was not a mere royal mouthpiece. The coalition ministry went out of office on Fox's Indian Bill in December, 1783, and Lord North, who was losing his sight, then finally gave up political ambition. He played, when quite blind, a somewhat important part in the debates on the Regency Bill in 1789, and in

the next year succeeded his father as earl of Guilford. He did not long survive his elevation, and died peacefully on August 5, 1792.

NORTH, SIR DUDLEY, political economist, was third son of Dudley, fourth Lord North, who published, besides other things, *Passages relating to the Long Parliament*, of which he had himself been a member. He was born May 16, 1641. During the Tory reaction under Charles II. he was a pliant instrument in the hands of the court, and was one of the sheriffs forced on the city of London with an express view to securing verdicts for the crown in the state trials of the period. Having been elected a member of parliament under James II., "he took," says Roger North, "the place of manager for the crown in all matters of revenue." After the Revolution he was called to account for his alleged unconstitutional proceedings in his office of sheriff, and did not show much highmindedness in his defense. He died December 31, 1691.

NORTH, ROGER, in writing his *Examen* of Kennet's *History of England*, and the "Lives" of his brothers, Lord Keeper Guilford, Sir Dudley North, and John, master of Trinity College, Cambridge, became one of the original authorities for the political and social history of the reigns of Charles II. and James II. He was born in 1650 and died in 1733.

NORTH, SIR THOMAS, son of Edward North, first Baron North of Kirtling, is memorable as the author of the English version of Plutarch's *Lives* that supplied Shakespeare with materials for his classical plays. Materials for a biographical notice are extremely scanty; and neither the exact date of his birth nor that of his death is known. His literary career was long, for he was living in decayed old age in 1603 when a third edition of his Plutarch was published with a supplement of other translated biographies.

NORTH ADAMS, a township, manufacturing village, and important railway junction in Berkshire county, Mass., on the Hoosac river, 143 miles from Boston by the Troy and Boston Railroad. Cotton and wool weaving and shoemaking are the leading industries. The population of the township, formerly included in Adams township, is 16,074. About a mile to the east of the village the Hudson's Brook is arched over for a considerable distance by a romantic cave from thirty to sixty feet in height. Nathaniel Hawthorne, who spent the summer of 1838 at North Adams, gives a fine description of the spot.

NORTHALLERTON, a market-town and parliamentary borough in the North Riding of Yorkshire, is situated on a small stream, the Sun Beck, a tributary of the Wiske, and on the Northeastern Railway, about forty miles north of Leeds and seventeen north of Ripon. Population (1890), 4,000.

NORTHAMPTON, an inland county of England, is bounded north by Lincoln, northwest by Rutland and Leicester, west by Warwick, southwest and south by Oxford, southeast by Buckingham, and east by Bedford, Huntingdon, and Cambridge. It has an area of 629,912 acres, or about 982 square miles. Its greatest length from northeast to southwest is about seventy miles; in breadth it varies from seven to twenty-six miles. The county forms the principal watershed of central England, nearly all the more important rivers of this region having their sources within its boundaries.

The iron of Northamptonshire was made use of by the Romans, but the rise of the modern industry dates from about 1850. In 1881 iron was worked at thirty different places in the county, the total quantity obtained being 1,270,544 tons. About one-fourth is smelted in the district, but the greater quantity is sent raw to Merthyr-Tydfil and Staffordshire.



Scale of Statute Miles.
0 5 10 20 30 40 50 60 70

LONGITUDE WEST FROM WASHINGTON. 10° Read, McNally & Co., Engrs, Chicago. 1°

The climate of Northamptonshire is mild and genial, while the absence of lofty hills renders it much drier than many other inland districts. The prevailing soil is a rich brown but light and crumbling mold, sometimes with a rocky subsoil. The richest soil is the black mold of the fen district, which is specially suited for grass, as are all the heavier soils. Nearly all the land is capable of cultivation, although there is some stiff wet soil on the slopes of the hills. The population of Northamptonshire in 1801 was 131,757, which in 1821 had increased to 162,483, in 1871 to 243,891, and in 1881 to 272,555 (135,662 males and 136,893 females).

NORTHAMPTON, a municipal and parliamentary borough, and the county town of Northamptonshire, is situated on the slope and summit of an eminence rising above the river Nene, on a branch canal connecting it with the Grand Junction Canal, sixty-five miles north-northwest from London. The older houses are substantially built of stone, the newer ones of brick with stone facings. Formerly there were seven parish churches, but of these only four now remain, All Saints, St. Giles', St. Peter's, and St. Sepulchre's. Among the educational establishments are a free grammar school (1552), a government school of art (1871), and a bluecoat school, in addition to charity, church, and school-board schools. The charitable foundations comprise St. John's Hospital, founded in the twelfth century; St. Thomas Hospital, founded 1450, in honor of Thomas à Becket; the general infirmary (1747), the general lunatic asylum (1837), the union workhouse (1837), and the Royal Victoria Dispensary (1844). Among the public buildings are the town hall in the Gothic style (1864), the county hall in the Grecian, the corn exchange buildings in the Italian, the county jail, the borough jail, the barracks, and the theater. There is a fine public promenade, and a racecourse with an area of 117 acres. A new cattle market was opened in 1873. Northampton is unrivaled in England for the manufacture of boots and shoes. There are also currying-works, breweries, maltings, iron-foundries, flour and paper mills, and brick and tile works. The population is 60,000.

NORTHAMPTON, the county seat of Hampshire county, Mass., is situated on the west side of the Connecticut river, seventeen miles by rail north of Springfield, and is connected with Hadley by a bridge 1,230 feet long. The village of Northampton lies in rich alluvial meadow-land, about a mile from the bank of the river, and with its semi-rural streets and venerable trees has the reputation of being one of the prettiest villages in New England. Of note among its buildings are Smith College (1871; endowment, \$500,000) for the higher education of women, the free public library (18,000 volumes) and memorial hall, the Clarke institution for deafmutes (1867; endowment, \$300,000) on rising ground to the west, and the State lunatic asylum (1858; 460 patients). A tramway runs three miles to Florence, a manufacturing village producing sewing-machines, silk goods, paper, etc. The population of the township was 5,278 in 1850, 6,788 in 1860, 10,160 in 1870, and is now 14,990.

NORTHAMPTON, HENRY HOWARD, EARL OF, the second son of the earl of Surrey, the poet, born about 1539, was restored in blood by the first parliament of Elizabeth. He bore a high character for learning, but during the greater part of Elizabeth's reign he remained in obscurity, sharing the fortunes of his family. In 1604 he was made lord warden of the Cinque Ports and earl of Northampton. In 1608 he became lord privy seal, and in 1612 one of the commissioners of the treasury. Northampton died in 1614.

NORTHAMPTON, SPENCER COMPTON, EARL OF,

born in 1601, accompanied Prince Charles to Spain in 1623. He succeeded to the earldom in 1630. In the Civil War he took the king's side, opposing Lord Brook in Warwickshire in 1642, and taking part in the battle of Edgehill. On March 19, 1643, he was dismounted in the fight at Hopton Heath near Stafford, and was immediately slain.

NORTH ATTLEBORO, a town of Bristol county, Mass., thirty-two miles southwest of Boston. It contains a bank, a high school, four churches, a newspaper office and some manufactures. Population (1890), 7,000.

NORTH BRIERLEY, an urban sanitary district in the West Riding of Yorkshire, England, about two miles south of Bradford. There are extensive collieries in the district as well as blast and puddling furnaces and rolling-mills, the ironworks at Low Moor employing between 3,000 and 4,000 persons. The population of the urban sanitary district (area 4,309 acres) in 1871 was 18,616, and in 1881 it was 20,935; that of the township of North Brierley (area 3,342 acres) in the same years was 14,433 and 15,620.

NORTH CAROLINA, one of the original thirteen States that formed the American Union, is situated on the Atlantic seaboard, and stretches 500 miles east and west across the entire breadth of the Atlantic slope of the Appalachians in a long, narrow, rudely triangular belt, its western extremity, less than twenty miles wide, resting on the highest plateau and summits of that continental system of mountains, while its eastern end spreads out to a breadth of 200 miles in a low, level, and gently undulating plain on the Atlantic coast, with a curving shore-line of more than 300 miles. Its area is 52,286 square miles, of which 3,620 are covered by water.

The western section is a rugged mountainous plateau; it forms a narrow, irregular, much indented trough, lying between the bifurcating chains of the western and dominant arm of the southern prolongation of the Appalachians—the Smoky Mountains and the Blue Ridge—the former being the western boundary of the State. The length of this plateau from northeast to southwest is more than 200 miles, its breadth 15 to 50 miles, and its area nearly 6,000 square miles. The Smoky chain has a general elevation of from 5,000 to 6,000 feet, rising in many summits to 6,500 feet and upward. The Blue Ridge, which constitutes the eastern boundary of the plateau, is a very sinuous and angular and straggling mountain chain, with a general elevation of from 3,000 to 4,000 feet and upward, a few of its higher summits, about midway in the State, reaching nearly 6,000 feet.

This middle region of the State is a country of hills and valleys and rolling uplands. The area of this region is about 20,000 square miles; its altitude, descending gradually from 1,000 to about 200 feet, averages about 650 feet. Eastward, to the sea, lies a great champaign, 100 to 120 miles wide, and 20,000 square miles in area. Toward the coast it is diversified by numerous and extensive sounds, bays, rivers, lakes, marshes, swamps, and islands, the whole surface for fifty miles inland from Hatteras and the eastern shore being less than twenty feet above sea-level. The sea is walled off from this low-lying territory by a long linear chain of sand-islands or dunes, ranging from 75 to 100 feet and upward in height, and separated in half a score places by inlets which connect the sounds with the ocean.

The features above described give the main outlines of the drainage system, the Blue Ridge being obviously the chief factor. The streams which rise east of that chain empty into the Atlantic, either directly through the territory of this State or by crossing also that of South Carolina; those which rise west of it seek the

Mississippi and the Gulf of Mexico, partly by way of the Tennessee, many of whose chief affluents have cut their way in a northwesterly course across the mountain plateau and through the Smoky range, and partly by way of the Ohio, leaving the plateau in a northeasterly direction and reaching that river by the Kanawha through Virginia. Several of the most considerable rivers take their rise in the midland region. The numerous rivers of the eastern section, as they approach the sounds and the sea, broaden into bays of two, three, and five miles in width, through which the movement of the tide is felt to a distance of fifty and sixty miles inland, and many of them are navigable for more than 100 miles to the lower falls near the western border of the alluvial region.

In climate North Carolina resembles France and Italy. The position of the eastern end on the Atlantic and its projection southward beyond the parallel of 34° , together with the near approach of the Gulf Stream, give this part of the State a sub-tropical climate, its isotherm (66°) being that of the southern half of the Gulf States and of Nicolosi in Sicily, while the great elevation and inland recession of the western section bring its climate to that of the cold temperate zone, the isotherm for the higher plateaus (51°) being that of New England and Upper Canada. The average annual mean temperature of the State is 59° ; for the eastern region it is 61° , for the middle 58° , and for the mountainous region 52° . During a recent winter of unusual severity the thermometer several times indicated 30° and 40° below zero in Michigan and New England, while in North Carolina 10° above zero was reached but once. The mean annual rainfall is nearly double that of England and France, the average for the State being fifty-two inches, and for the east, middle, and west, respectively, sixty, forty-five, fifty-eight inches. This precipitation is distributed nearly uniformly through the different seasons, with a slight preponderance in the amount of summer rain and a correspondingly less quantity in the autumn. The climate is favorable to human health, except in limited malarial tracts in the lowlands on some of the rivers. The death-rate for this State is less than the average for the United States, and one of the two areas where consumption is unknown is found here.

In consequence of the wide distribution of the older rocks there is a notable abundance and variety of minerals. More than 180 species have been discovered, some of great rarity; and one of them has recently yielded to science two new metallic chemical elements. Nearly a score different species of gems have been found, including the diamond, ruby, sapphire, emerald, beryl, lazulite, amethyst, garnet agate, and zircon. There occur also many minerals having special applications in the useful arts, viz., mica, corundum, asbestos, baryte, chromite, iron, garnet, zircon, kaolin, black oxide of manganese, talc, pyrophyllite, etc. Mica is found in large veins or dykes in all the terranes of Montalban gneisses, but the most extensive and valuable mines are found in the mountain region, where workable veins are numerous and extensive and the sheets of mica of unusual size and excellence. Corundum is about as widely distributed as mica, and occurs in the same series of rocks, as well as in some of the slate belts. In this region are also numerous beds of white and variously-colored marbles. Building stones of every variety are found in nearly all the sections, and whetstone, millstone, and grindstone grits, as well as potter's clay and fireclay; and in the seaboard section are immense beds of peat. Iron, copper, and gold ores are coextensive with the outcrops of the metamorphic rocks. Blackband ore is associated with the coal, and spathic ore occurs as the gangue of several copper and gold mines in the

middle region. Iron for domestic consumption has been manufactured for a hundred years in the middle region and half as long in the other sections. Gold occurs in both placers and veins from Halifax county on the upper margin of the eastern champaign, within 110 miles of the seacoast. These deposits cover several hundred square miles of territory, and are of Quaternary or more recent age. Compared with those of California, they are of very slight thickness, generally not above five or ten to twenty feet, and only occasionally reaching forty and fifty feet. The most important and valuable vein mines are also found in the midland region. One of these, the Gold Hill mine near Salisbury, has been wrought to a depth of 750 feet, and its total produce exceeds two million dollars of bullion.

The whole area of the State was originally forest-covered, and about two-thirds of it is still in the primitive condition, except that the woods are much denser in consequence of the cessation of the annual burnings by which the Indians kept down the brush and preserved them in an open park-like condition. The great variety of soils, together with the wide range of climate, gives rise to a remarkably rich and varied flora. Of twenty-two species of oak found in the United States east of the Rocky Mountains, nineteen occur here; of eight pines, all are found in one section or another; of five maples, all; of nine hickories, six; of seven magnolias, all; of five birches, three; and so on. The total number of trees found in the State is 112, and there are just twice as many shrubs, many of them twenty feet and upward in height, which together give these forests an aspect of wonderful richness and variety, "comparing favorably with almost any portion of the tropics." Among the trees are many valuable and popular cabinet woods, such as the walnut, holly, cherry, ash, cedar, bird's-eye-maple, sycamore, etc. These forests are rapidly increasing in value as those of the northern States disappear and as the demand for timber increases.

In 1790, at the first United States census, the population was 390,000. In 1860, the year before the Civil War, it had risen to 992,622, of whom 391,522 were colored. In 1870, it was 1,071,361, an increase during this decade of less than 8 per cent. In 1880 it was 1,339,750 (531,277 colored, and 1,230 Indians), and the census of 1890 gave it at 1,617,947. The foreign-born population numbered but 3,742. The people of this State are among the most rural in the United States. The largest city does not contain 30,000 people, and only six exceed 7,000, viz.: Wilmington, 20,056; Raleigh, 12,678; Charlotte, 11,557; New Berne, 8,000; Asheville, 10,235; Winston, 8,018.

Cotton and rice are staple products of the east, live stock, buckwheat, and other north-temperate zone products, of the mountain region; in one section or another may be found every agricultural product grown between the great lakes and the Gulf, except the orange. Indian corn occupies the largest acreage, and this and the other cereals are common to all sections. Cotton is raised in two-thirds of the counties. It is the chief market crop of the eastern and of the southern half of the middle region. The limit of cotton culture has extended northward twenty to fifty miles in the last fifteen years, and the produce has increased nearly threefold. In the northern half of the middle and Piedmont districts tobacco replaces cotton as the market crop. Within ten years its culture has extended into a large portion of the mountain region. The northern tier of counties, next to the Virginia border, is known as the Bright Tobacco Belt—the larger part of the yellow or gold-leaf tobacco of commerce being produced in this narrow zone. This crop has also largely increased in the last ten years. The cultivation of the vine is also in-

creasing in all sections of the State. According to Humboldt's thermal criteria the whole State lies within the zone most favorable to this industry. His conclusions are confirmed by experience in every part of the State, and by the fact that several of the most popular grapes have originated here, such as the Catawba, Isabella, and Scuppernong.

The following table gives the principal crops in 1888:

PRODUCTS.		Acres.	Value.
Indian corn.....bushels	35,830,000	2,673,910	\$21,139,700
Wheat..... "	5,094,000	717,442	4,482,720
Rye..... "	395,000	68,173	316,000
Oats..... "	8,504,000	654,116	3,741,760
Barley..... "	3,000	287	2,250
Buckwheat..... "	57,000	7,088	34,200
Potatoes..... "	1,114,000	21,427	657,260
Tobacco.....pounds	29,155,000	60,113	2,915,481
Hay..... tons	159,750	138,913	1,688,558
Cotton.....pounds	204,047,260	1,066,301	17,752,112
Total.....		5,407,770	\$52,730,041

Mining and other industries, although of very subordinate interest, have long given occupation to a small portion of the population. Gold was first discovered in 1819, and between that date and 1850 hundreds of gold and copper mines were opened in the middle and western sections, and many thousands of the population were occupied in these industries. The total product of the gold mines between those dates is estimated at about \$10,000,000. In the last few years mining industries have received a new impulse. Iron ores are mined on a considerable scale for export, many new gold and copper mines have been opened, and the amount of the output of the various mining industries is increasing very notably. Mica mining began fifteen years ago in the mountain region, and has grown to considerable importance, much the larger part of this material found in commerce being produced here. The annual yield is about 40,000 pounds, and is continually increasing.

The fisheries of the eastern rivers and sounds are large and profitable, and give employment to several thousand people. And in this region the getting of lumber, both in the pine forests and in the cypress and juniper swamps, has been an important source of profit since its first settlement.

The manufactures of North Carolina occupy a very subordinate place and are mainly domestic and auxiliary to the one dominant agricultural interest. The value of the total annual output, as given by the census of 1880, is \$20,095,037. Of this sum \$2,554,482 is derived from the manufacture of cotton goods, \$2,215,154 from that of tobacco, \$1,758,488 from turpentine and tar.

In ten years the number of miles of railroad has been nearly doubled, and is now 3,110 miles. There are 1,000 miles of waterways open to steamboat navigation, including rivers, bays, sounds, and canals, forming a nexus of lines of communication extending over the whole eastern and seaboard region and connecting with the various ports along the coast from Wilmington to Norfolk in Virginia.

The executive power is vested in a governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction, and attorney-general, who are elected by ballot, and hold office four years. The legislative power is vested in a general assembly, which consists of a senate of fifty members and a house of representatives of 120 members, who are elected for two years and hold biennial sessions. The judicial power is vested in a supreme court, superior courts, and courts of justices of the peace. The supreme

court consists of a chief justice and two associate justices. The State is divided into nine judicial districts, and there is one superior court judge to each. The judges of the supreme and superior courts are elected by popular vote for a term of eight years. The justices of the peace, who administer the law in the counties, are appointed by the legislature. A capitation tax, which may not exceed \$2, is levied for the support of a system of education. Other State taxes are levied *ad valorem*, and amount at present to 32 cents on each \$100 worth of property, and this on a very low valuation. The public debt is \$5,939,131. The total assessed valuation of property is \$211,944,270; the real value is about \$350,000,000. A system of public schools is established by law and supported by funds derived from State taxes, and increased by county and municipal levies. The schools are required to be kept open four months in the year.

The coast of North Carolina was the scene of the first effort of the English to colonize America. In the years 1585 to 1587 Sir Walter Raleigh dispatched hither five fleets in succession, and planted three small colonies, which disappeared one after the other and left no trace. In consequence of these failures, due in large measure to the peculiar conformation of this difficult coast and the want of good harborage, the next expedition, twenty years later, was directed to strike the coast farther north, about the mouth of the James river, where the first permanent settlement was effected; and no further attempt at direct colonization from Europe was made for three-quarters of a century. Thus, instead of being the first of the American colonies in point of time, the colony of Carolina came very near being the last. The southern boundary of the colony of Virginia was the parallel of 36° 30' N. latitude, although the whole continent was still called by that name, and all the country south of this limit to the Gulf was granted by Charles II. in 1663 and 1665 to a company of English noblemen styled the lords proprietors, with full powers of colonization and government. In this territory, called Carolina in compliment to the royal grantor, the colony of Carolina was planted by them under a new form of colonial government called the proprietary government, consisting of a governor appointed by themselves, a legislative assembly elected by the freeholders, and a council of twelve, six appointed by the governor and six by the assembly. In 1669 the first legislative assembly met, and a new and remarkably liberal government was successfully organized. The next year an attempt was made to introduce a new system of government and form of social order called the Fundamental Constitutions, drawn up by the celebrated philosopher John Locke at the request of the lords proprietors; but this and several subsequent attempts were so stoutly resisted by the colonists that the absurd and tyrannous scheme was formally abandoned in 1693. In 1729 the proprietary was replaced by the royal authority, the form of government remaining unchanged. At this date also the territory of Carolina was formally divided into the two colonies of North and South Carolina. The population at this time, estimated at 13,000, was mostly limited to the seaboard region, within fifty miles of the coast.

The execution of the infamous Stamp Act in 1766 was forcibly resisted, and the royal vessel bringing the obnoxious papers was not even allowed to enter port. Extortion practiced by the officers of the crown in some of the interior counties led to repeated remonstrances and appeals for redress to the governor and afterward to parliament, and finally ended in 1771 in insurrection and open war. The controversy culminated in the battle of Alamance, in which the recusants were defeated by Governor Tryon. And thus, in one way and an

other, a spirit of suspicion or resentment, of irritation or open hostility, was constantly kept alive in the colony. This spirit found expression in the famous Mecklenburg resolutions adopted by the Scotch-Irish settlers about Charlotte in May, 1775, in which "all laws and commissions by authority of king and parliament" are declared to be annulled and vacated, and a new government was organized for the county recognizing only the authority of the Provincial Congress. Thus North Carolina was fully ripe for measures of open and combined resistance when movements were begun toward a union of the colonies for this purpose, and was the first of all the colonies to instruct its delegates to the Continental Congress to vote for formal independence of the British crown. Early in 1776 the militia of the colony met and defeated on the lower Cape Fear river a body of 1,500 British troops under skillful officers, directed by the royal governor, and supported by a British fleet of thirty sail off the port of Wilmington. The colony furnished its full quota of troops to the continental armies north and south, and lost most heavily in the fall of Charleston. The defeat and capture of an important detachment of Cornwallis' army under Ferguson at King's Mountain, in 1780, by a sudden gathering of untrained backwoodsmen and hunters, chiefly from the mountain settlements, checked the victorious march of the British; and a similar volunteer gathering of her yeomanry from all the surrounding region at the battle of Guilford Court House, in 1781, contributed largely to give the victory of Cornwallis the character of a defeat, and forced his speedy retreat to the coast and ultimately to Yorktown for the final catastrophe.

On the formation of the Federal Union, North Carolina, having had abundant and long experience of usurpation and misgovernment, did not make haste to enter the new compact, but moved with slow and cautious steps, and was one of the last of the colonies to adopt the constitution. At the breaking out of the war between the States in 1861, North Carolina, strongly averse to secession, sought by every means to avert the conflict, remaining unmoved after all the surrounding States had seceded, and was forced into the struggle almost last of the Southern States, and when there remained only the alternative of a choice of sides. Being near the seat of war and yet for the most part outside of it, the State contributed more largely to the commissary supplies of the Confederacy, and also sent into the field a larger number of troops and lost more men in battle than any other State, her soldiers having a conspicuous share in all the great battles from Bull Run to Petersburg. Since the close of the war, which left her utterly bankrupt, North Carolina has entered on a career of prosperity unexampled in her previous history. Population has increased far more rapidly than at any previous period, the number of miles of railroad has been doubled, the area of land under cultivation enlarged, agriculture improved in its methods and results, and industries diversified to an extent and with a rapidity never known before.

NORTHCOTE, JAMES, historical and portrait painter, was born at Plymouth, England, on October 22, 1746. In 1769, he started as a portrait-painter. Four years later he went to London, and was admitted as a pupil into the studio and house of Reynolds, who had been the object of his warmest admiration from early boyhood. He was elected associate of the Academy in 1786, and full academican in the following spring. He died July 13, 1831.

NORTH DAKOTA. A full description of the territory now included in the two Dakotas is given under the head of **DAKOTA** in Vol. III, pp. 1896, *et seq.* Both North and South Dakota were admitted to the

Union on Nov. 3, 1889. The boundaries of North Dakota are: north by Manitoba and the Northwest Territory; south by South Dakota, on the line of the 46th parallel; west by Montana, and east by Minnesota.

NORTHFLEET, a village and urban sanitary tract in the county of Kent, England, is situated on the Thames and the North Kent Railway, twenty miles east of London. Population (1890), 9,000.

NORTH SEA. The North Sea or German Ocean lies between Great Britain and the continent of Europe. It communicates with the North Atlantic by the Straits of Dover in the south, and by the Pentland Firth and the various openings between the Orkney and Shetland Islands in the north. Between the Shetlands and Norway it passes by a wide opening into the sub-polar basin, now generally known as the **NORWEGIAN SEA** (*q.v.*), of which indeed it may be regarded as a southern extension. It has communication with the Baltic by the Skagerrack and the Cattegat. The shores of the North Sea have from their earliest times been inhabited by brave and hardy races of men famous for their maritime exploits; and at the present day it is surrounded by many of the most prosperous and enterprising commercial nations, and is, in consequence, one of the most important highways of the world. Its fisheries give employment to thousands of persons, and are the most valuable that exist. Lighthouses are situated on nearly every available point where they are required, and there are numerous lightships along the coasts.

The North Sea has all the characteristic features of a great bay, and has a great abundance of plant life. Its surface or intermediate waters are at times quite discolored by the enormous abundance of Diatoms or Peridiniæ which are met with in vast floating banks. The cause of the rapid and great development of these minute organisms at particular times and places appears to depend on physical conditions which are not at present understood. With such a vast food supply it is not surprising that a prolific fauna swarms in the North Sea. Everywhere on the bottom we find foraminifera, sponges, coelenterates, echinoderms, worms, polyzoa, tunicata, molluscs, crustacea, and fishes. At all depths in the intermediate water we find protozoa, medusæ, copepods, amphipods, schizopods, sagitta, and various other pelagic animals, together with a great abundance of the larvæ of animals living on the bottom. The invertebrates living on the bottom and in the water at various depths, in their adult as well as in their larval stages, supply food for those fishes which are so much desired for the table. Most valuable food fish, as the cod, haddock, herring, sprat, halibut, sole, coal-fish, and many others, frequent the North Sea, and are captured in great numbers.

NORTHUMBERLAND, the northernmost county of England, is of a somewhat triangular form, roughly resembling that of England itself, and is in extremes about seventy miles long and fifty-three broad. Its area is 2,016 square miles, ranking it fifth among English counties. Northumberland lies entirely on the easterly slope of the country. Its boundaries are the German Ocean, Scotland, and the counties of Cumberland and Durham. In physical aspect it is a tumbled incline of fells and ridges, intersected by valleys and subsiding eastward from the hill-borders of Scotland and Cumberland into lessening undulations and a shelving coast. The Cheviot range (separating Northumberland from Scotland) is divided by nature into two groups. What may be called the northern Cheviots are green hills of conical and high-arched forms, finely grouped, with the peat-capped Cheviot itself (2,676 feet) at their center, deep, steep glens radiating into all parts of their mass, and generally more or less of hollow and inclosed

ground separating them from the slopes at their base. The southern Cheviots (southwestward from Thirlmoor) are the highest part of the county.

The chief rivers and valleys are the Derwent, the Irthing, the Tyne (with its North and South branches, the Allendales, and Redesdale), the Wansbeck with its twin the Font, the Coquet, the Alne, the Till with its feeders, the Breamish, Glen, and College, and the Tweed.

The coast is a succession of sands, flat tidal rocks, and low cliffs. Its bays are edged by blown sandhills; its borders are severely wind-swept. Several islands lie over against it. Holy Island, the classic Lindisfarne, 1,051 acres in extent, but half "links" and sandbanks, is annexed to the mainland and accessible to conveyances every tide. The Farne Islands are a group of rocky islets farther south—the scene of many saintly austerities, and of the nobler devotion of Grace Darling.

The main portion of the great northern coal-field that extends into Northumberland is an uneven triangle, with its base stretching fourteen miles inland from the mouth of the Tyne, and its apex on the coast twenty-four miles northward. There are eighteen or twenty seams of workable thickness, all of them of varieties known as bituminous or "caking" coal, amounting in the aggregate to nearly sixty feet in thickness. According to the mineral statistics the output of coal from the 176 collieries worked in Northumberland was 14,518,789 tons, as against 36,299,597 tons from the whole coal-field, and 156,499,977 tons from the United Kingdom. The net quantity of coal in Northumberland available for the future was estimated before the Coal Commission in 1870 as 2,576,000,000 tons, besides 403,000,000 tons under the sea within two miles of land. The rate of production is increasing annually.

The "lead-measures" in Northumberland chiefly lie in South Tynedale and Allendale, and belong to the Upper Limestone series or Yoredale rocks. The Cleveland ironstone and cheap foreign import have repressed iron-mining in Northumberland. Among other mineral products are building freestones in profusion; millstone grits, not at all restricted to the strata bearing the name; fireclays, chiefly of value among the Coal-measures; brick clays from glacial beds; and disintegrated shales.

Among the larger fauna of the county are the half-wild white cattle of Chillingham Park, the representatives, according to the best authorities, of the aboriginal cattle of the British forests, and degenerated descendants of the great Urus, or *Bos primigenius*.

The climate is bracing and healthy. In spring east winds prevail over the whole county. The lambing season in the higher uplands is fixed for the latter half of April, and is even then often too early. In summer and autumn west winds are general.

The population in 1881 numbered 434,086 persons, 215,882 males and 218,204 females—showing an increase since 1871 of 47,440 persons, and of 256,008 since the first census in 1801.

Northumberland contains 1,290,312 acres. In the *Agricultural Returns* for 1883 the cultivated area of the county stands as 712,615 acres, exclusive of orchards and market gardens. The manufactures of this county chiefly come from the Tyne, which is a region of iron-works, blast-furnaces, shipbuilding yards, ropeworks, coke-ovens, alkali-works, and manufactories of glass, pottery, and firebricks, from Newcastle to the sea (see NEWCASTLE). The Tyne is the most productive salmon-netting river from a commercial point of view in England and Wales. The richness of its fisheries is mentioned in the time of Henry I. According to

Professor Huxley's report, the estimated catch in 1882 was 41,110 salmon and 10,336 salmon-trout. The pre-Roman antiquities of Northumberland are camps, cairns, standing-stones (both monoliths and fragmentary circles), sculptures on rock, hand-made pottery, and weapons, ornaments, etc., of stone, bronze, iron, jet, glass, and gold. In Roman military antiquities this is the premier county of Britain. For the great wall between the Tyne and the Solway, see HADRIAN'S WALL. The Roman road from London nearly bisects the county, and still goes familiarly under the name of "the Watling Street." It passes numbers of quadrangular camps, three of which were permanent stations. Its eastern branch, the Devil's Causeway, leaves it near the Tyne for Berwick. In the southwest of the county lay the Maiden Way, making for Liddesdale. Coal, iron, and lead appear to have been worked by the Romans. Numerous heaps of heavy iron slag, mingled with charcoal, are the sites of little "bloomeries" on the uplands. They may be of different ages, from that of the Britons downward.

NORTHUMBERLAND, KINGDOM OF. The history of Anglo-Saxon England is the history, not of a heptarchy of independent and equal or nearly equal kingdoms united by any kind of federal bond, but of the rise and progress of the kingdom of Northumberland from the end of the sixth to the middle of the eighth century under Ethelfrith and the descendants of Edwin of Deira, the predominance of Mercia during the latter half of the eighth century under Offa, and the gradual union of England under the descendants of Egbert of Wessex between the close of the eighth century and the Norman Conquest.

NORTHWESTERN PROVINCES, THE, a lieutenant-governorship of British India, lying between 23° 51' and 31° 5' N. latitude and between 77° 3' and 84° 43' E. longitude, is bounded on the north by Tibet, on the northeast by Nepal and Oudh, on the south by the Chutiá Nágpur districts of Bengal, Rewah, the Bundelkhand states, and the Central Provinces, and on the west by Gwalior, Rájputána, and the Punjab, with an area under British administration of 81,858 square miles. The administrative headquarters and seat of the lieutenant-governor are at Allahábád.

The Northwestern Provinces include the whole upper portion of the Gangetic basin from the Himálayas and the Punjab plain to the Vindhya plateau and the low-lying ricefields of Bengal. Taken as a whole, the lieutenant-governorship consists of the richest wheat-bearing country in India. It contains many of the most famous cities of Indian history and is studded with thriving villages, interspersed at distances with large commercial towns. Except during the hot months, when the crops are off the fields, the general aspect is that of a verdant and well-tilled but monotonous plain, merging into hilly or mountainous country at the extreme northern and southern edges of the basin. Besides the three great rivers—the Ganges, Jumna, and Gogra—there are the following secondary streams, each with numerous minor tributaries:—The East and West Káhi and the Hindan flow through the Doáb; the Chambal intersects the trans-Jumna tract; in Bundelkhand the principal streams are the Betwá and the Ken; the Rám-gangá, rising in Garhwál, pursues a very tortuous course through Rohilkhand; the Gumti enters the Provinces from Oudh, and flows past Jaunpur to join the Ganges; the trans-Gogra region is divided into two nearly equal parts by the Rápti. All the drainage of the country falls directly or indirectly into the Ganges.

The climate of the Northwestern Provinces as a whole may be classed as hot and dry.

The Northwestern Provinces contain a denser popu-

lation than any country of Europe, excepting Belgium and England. The census of 1881 returned the population of the British districts at 32,720,128 (males 17,060,901, females 15,659,227), distributed among 81,274 villages and towns. Including the two attached native states of Garhwál and Rámpur, the area amounted to 86,983 square miles, and the population to 33,461,878.

Most of the people are gathered into small villages. There are, however, no fewer than 238 towns with a population exceeding 5,000, and containing an aggregate of 3,513,107 inhabitants. No other part of India contains so large a proportion of celebrated cities, though recent changes have made over Delhi, the most famous of all, to the adjacent province of the Punjab. Thirteen towns contained in 1872 a population exceeding 50,000—namely, (1) Benares, 199,700; (2) Agra, 160,203; (3) Cawnpur, 155,444; (4) Allahábád, 148,547; (5) Braeli (Bareilly), 113,417; (6) Meerut, 99,565; (7) Sháhjahánpur, 74,830; (8) Murádábád, 67,387; (9) Farrukhábad, 62,437; (10) Koil (Aligarh), 61,730; (11) Saháranpur, 59,194; (12) Gorakhpur, 57,922; (13) Mirzápur, 56,378. Eighteen towns contain a population of between 20,000 and 50,000.

Of a total area of 81,858 square miles, 38,169 were returned as under cultivation in 1881–82. Eleven great canal irrigation works have been undertaken by the government—(1) Ganges Canal, (2) Eastern Jumna Canal, (3) Agra Canal, (4) Dún Canals, (5) Rohilkhand Canals, (6) Bijnaur Canals, (7) Bundelkhand Lakes, (8) Lower Ganges Canal, (9) Bundelkhand survey, (10) Sardah Canal survey, and (11) Betwá Canal. The total area irrigated in 1881–82 by government works amounted to 1,395,217 acres. There are two principal harvests, in autumn and spring. The great agricultural staple is wheat. The chief commercial crops include indigo, cotton, sugar, oil seeds, and opium. The cultivation of tea is confined to the submontane districts of Kumáun, Garhwál and Dehra Dún.

The exports of the Northwestern Provinces are principally confined to its raw agricultural produce—wheat, oil-seeds, cotton, indigo, sugar, molasses, timber, and forest produce, dyestuffs, *ghí*, opium, and tobacco. The imports consist mainly of Manchester piece-goods, metal-work, manufactured wares, salt, and European goods. The Northwestern Provinces are under the administrative charge of a lieutenant-governor, who resides at Allahábád. The total revenue (including that of Oudh) in 1881–82 amounted to \$45,000,000, and the expenditure to \$21,500,000. The chief item of receipt is the land-tax, which produced during the same year \$28,500,000. Education is making steady progress throughout the central Gangetic plain, though still very backward in the Himálayan districts, in Bundelkhand, and in the remoter parts of Rohilkhand and the trans-Gogra tract. The total number of colleges and schools in the Northwestern Provinces in 1881–82 was 5,063, with a roll of 170,966 pupils, of whom 142,190 were Hindus and 24,437 Mohammedans. The principal institutions for higher English education are the Muir Central College at Allahábád, and the Government and Church Missionary Society's Colleges at Agra. The Benares College gives high Sanskrit education, while Delhi College, just beyond the borders, gives instruction in Arabic and Persian. Primary education is afforded by a complete system of village schools, the provinces being divided into three circles of inspection, and elementary instruction is now brought within easy reach of all who choose to avail themselves of it.

The traditions of the *Mahábhárata* cluster around the city of Hastinapur in Meerut district, which, with Indraprastha, whose shapeless ruins are still to be seen

near Delhi, formed the respective capitals of the Pandavas and Kauravas. The earliest empire in this part of India, however, of which any certain monuments remain, was that of the Buddhist dynasty of Magadha, which attained its greatest development under Asoka.

Continuous history begins with the Mohammedan invasion of Mahmúd of Ghazni, who sacked the sacred cities of Kanauj and Muttra in 1017 A.D. Mohammed Ghorí, however, was the real founder of the Moslem power in Hindustán. In 1193 the seat of the Moslem empire was fixed at Delhi, where it remained, with few intermissions, till the British conquest.

The British first came into connection with the Northwestern Provinces as they advanced along the valley of the Ganges from Bengal. In 1763 the nawáb wazír of Oudh, with the phantom emperor Sháh Alam, invaded Bengal. They received a crushing defeat at Baxar, and the emperor, with Balwant Sinh, rájá of Benares, joined the British camp. In 1775 the nawáb of Oudh, Asaf-ud-daulá, ceded Benares, Jaunpur, and Gházipur to the British, retaining Allahábád and Korah, which had been taken from the emperor in the previous year, when the British sold them to Oudh.

The nawáb wazír, having agreed to pay a subsidy for the English troops maintained for his aid, and being always in arrear, signed, in 1801, the treaty of Lucknow, by which he made over to the British the whole of his Oudh dominions in the Doáb, together with Rohilkhand. For Lord Lake's campaign in 1803 against Sindhia, which brought the whole remaining portion of the Northwestern Provinces under British rule, see INDIA. The Himálayan districts of Kumáun and Garhwál were not acquired until after the Gúrkha war of 1814–15, while the Delhi territory remained the personal appanage of the Mughal royal family until 1832, when it passed to the direct government of the East India Company.

NORTHWESTERN TERRITORIES (of Canada), a group of four districts, organized in 1882, out of the territories of the Hudson Bay Company, known as Rupert's Land, and acquired in 1870 by the Dominion of Canada. Area, 431,000 square miles; population (estimated), 60,000; capital, Regina, on the line of the Canadian Pacific Railway, 357 miles west of Winnipeg. The districts lie in the great ranching and grain belt west of the province of Manitoba, and east of the Rocky Mountains and the province of British Columbia. The Northwestern Territory was at first a vague term designating all that portion of British North America which lay to the northwest of the old Canadian provinces of the St. Lawrence basin. The extent of this territory is estimated at two and one-quarter million square miles. In the British North America Act, of 1867, which constituted the Dominion, provision was made for the admission of this territory, and out of it, in 1870, the Prairie Province of Manitoba was carved. The original limits of this Province were from the international boundary line, 49° to 50° 30' N. latitude, and from 96° to 99° W. longitude. In 1881 the limits were extended north to 52° 30' and west to 101° 20'. In 1876 the district of Keewatin (area about 400,000 square miles), stretching from the northern limits of Manitoba to the Arctic Ocean, was constituted and placed under the jurisdiction of the Prairie Province. The vast plains to the west of Manitoba were then (in 1876) set apart into four districts or embryo provinces, and were at first governed by Manitoba. In 1882 these districts were placed under the administration of a lieutenant-governor and a council of five members, subject to instructions given by order in council or by the Dominion. Regina became the seat of local government. Subsequently (in 1888), by 51 Vic., cap. 19, a legis-

lative assembly was created for the Northwestern Territories, having the same powers and performing the same duties as the former Northwestern Council. The assembly is composed of twenty-two members, representing electoral districts, with three legal experts, appointed by the governor in council. Still more recently these Northwestern Territorial Districts have been given representatives in the Dominion parliament, the Senate having two members and the House of Commons four members. Of the latter, Alberta and Saskatchewan send one representative each, while Assiniboia sends two. The district of Athabasca has as yet no representation. The location and area of these four districts are as follows:—(1) Assiniboia (95,000 square miles), which lies west of Manitoba between $101^{\circ} 20'$ W. longitude and the line dividing the tenth and eleventh ranges of townships of the Land System Survey, and is bounded on the north by the ninth correction line (near 52° N. latitude). The chief towns in the district, which lie on the line of the Canadian Pacific Railroad, are Broadview, Qu'Appelle, Regina, Moose Jaw, Swift Current, and Medicine Hat; (2) Saskatchewan (114,000 square miles), lying north of Assiniboia and extending to about 54° N. latitude, with the same western boundary as Assiniboia. Its eastern boundary is the Nelson River and Lake Winnipeg. The chief towns of the district are Prince Albert and Battleford; (3) Alberta (100,000 square miles), which includes all the territory west of Assiniboia and Saskatchewan as far as the boundary of British Columbia. Its chief towns are Edmonton, Calgary, Banff, and Fort McLeod; (4) Athabasca (122,000 square miles), embracing the country due north of Alberta as far as 60° N. latitude. There are no towns in this latter district. The vast region to the north of the districts of Saskatchewan and Athabasca, watered by the Great Bear Lake, Great Slave Lake, and the Coppermine and Mackenzie Rivers, is politically unorganized. East of this region of solitude lie Keewatin and the inland sea of Hudson Bay. East of this, again, is a region known as the Northeast Territory, which is shut in from the Atlantic by Hudson Strait, Labrador, and the eastern portions of the Province of Quebec. The vast spaces in these unorganized territories are roamed by diminishing bands of Indians and Esquimaux, whose occupations are trapping, hunting, and fishing. The Hudson Bay Company maintain still a few trading-posts in the territory, the chief of which is York Factory on Hudson's Bay, at the mouth of the Nelson River. The resources of the organized districts of the Northwest Territories proper are enormous. They are chiefly agricultural and pastoral, with a little coal-mining. Assiniboia and Alberta are served by the Canadian Pacific Railway, which traverses these two districts. The Saskatchewan is served by the two branches of the great river of that name, whose outlet is in Lake Winnipeg. Nearly one-half the population of the organized districts of the Northwest Territories is Indian or halfbreed. Denominationally, the population is roughly classified as one-third Protestant, one-third Catholic, and one-third pagan.

NORTHWICH, a market-town of Cheshire, England, is situated at the confluence of the rivers Weaver and Dane, eighteen miles northeast of Chester and twenty-two southwest from Manchester. The streets are narrow and irregular, and many of the houses are screwed and bolted together to keep them secure from subsidences arising from the dissolving of the salt strata (180 feet in thickness), caused by the pumping of brine for the purpose of evaporation. Salt springs in Northwich were known to the Romans. By the Britons it was called the Black Salt Town. The substratum of rock-salt upon which

the town rests was first discovered in 1670. It consists of two beds, a lower and an upper, which lie horizontally, the lower about 330 feet from the surface. In the lower stratum there exist several mines in the neighborhood of the town. From two of these, each forty acres in extent, the rock-salt is produced. The average quantity of salt exported from the town annually amounts to over 500,000 tons. The population of the urban sanitary district (area 1,920 acres) is 12,246.

NORTON, HON. MRS. CAROLINE ELIZABETH, afterward Lady Stirling-Maxwell, ranks high among the women of letters of the nineteenth century. She was born in 1808. One of the three beautiful granddaughters of Sheridan, daughters of his son Thomas, "three Graces" of London society in the reign of George IV., she showed literary ambition and faculty before she was out of her teens. Her first publication, made at the age of seventeen, was a merry satire, *The Dandies' Rout*, illustrated by herself, full of girlish high spirits and wit. Her first essay in serious verse was made in 1829 with *The Sorrows of Rosalie*, the next in 1831 with *The Undying One*, a version of the legend of the Wandering Jew. She made an unfortunate marriage, in 1827, with the Hon. George Norton, brother of Lord Grantley; then, after three years of protests on her part and good promises on his, she had taken the decisive step of leaving his house for her sister's, had "condoned" on further good promises, and had returned, to find matters worse. The husband's unmanly persecutions culminated, in 1836, in an action brought against Lord Melbourne for seduction of his wife, which the jury decided against Mr. Norton's claims without leaving the box. Mrs. Norton made her own unhappy experience a plea for addressing to the queen, in 1855, an eloquent letter on the law concerning divorce, and her writings had considerable influence in ripening opinion for recent changes in the legal status of married women. During the reign of William IV., Mrs. Norton was at the height of her literary reputation, contributing many criticisms, sketches, tales, and songs to various periodicals and annuals, and using pencil as well as pen. Mrs. Norton's last poem was the *Lady of La Garaye* (1861), her last publication the half-humorous, half-heroic story of *The Rose of Jericho*, in 1870. She died on June 14, 1877. Mr. Norton died in 1875; and Mrs. Norton in the last year of her life was married to Sir W. Stirling-Maxwell.

NORWALK, a township in Fairfield county, Conn., on Long Island Sound, forty-three miles northeast of New York, at the terminus of the Danbury and Norwalk Railroad. It contains the borough of Norwalk, dating from 1836, and the city of South Norwalk, incorporated in 1870, the population being 6,000. Vessels drawing six feet of water ascend the Norwalk river at low tide, and there is regular steamboat communication with New York. Norwalk was settled about 1640 and incorporated as a town in 1653. The population in 1890 was 17,747.

NORWALK, a post-village of Ohio, the capital of Huron county, fifty-eight miles east of Toledo by the Lake Shore and Michigan Southern railway and is also on the Wheeling and Lake Erie railroad, is a flourishing place of 7,268 inhabitants (1890), containing planing-mills, grist-mills, manufactories of sewing-machines, organs, carpet-sweepers, and shoes, and breweries.

NORWAY comprises the western and northern divisions of the Scandinavian peninsula. It is bounded north by the Arctic Ocean, west by the Norwegian Sea and the North Sea, south by the Skagerrak, and east by Sweden, Finland, and Russia. The length of the coast-line, exclusive of fjords, bays, and islands, is 3,018

miles, and the area 122,780 square miles. The country, which has its greatest breadth, 280 miles, at the sixty-first parallel of latitude, is comparatively narrow, measuring only seventy miles across between the sixty-fourth and the sixty-eighth parallels. The Scandinavian peninsula constitutes for the most part a rocky region, of which the loftiest tracts lie on the Norwegian side. The interior of Finmark, the most northerly district of Norway, has no considerable heights; but the frontier between Sweden and Norway, from Tromsø stift to the southern part of Thronthjem stift, is marked by a continuous mountain range, called Kjölen (the keel), which, geologically, extends in lower levels still farther south as the frontier between the two countries. In this range are specially conspicuous the alpine regions occupying the interior of Tromsø stift, with peaks reaching a maximum altitude of 5,475 feet—the ice-clad tract of Sulitjelma east of Salten Fjord (6,178 feet), the heights east of Thronthjem Fjord (4,560 feet), and those east of Röros (4,680 feet). The narrower part of the mountain mass occurs on the side of the ridge facing the Norwegian Sea, the broader part on that facing the Baltic and its arms. In the latter direction, *i.e.*, eastward, the surface of the country presents a comparatively uniform slope, alike in Sweden and in the part of Norway lying south of the Dovre Fjeld and east of the Lang Fjelde.

In Norway the mountainous region constitutes chiefly a vast plateau extending wellnigh over the whole country. From this tableland rise the summits of the mountains, and the rocky mass itself is intersected by wide fissures, forming valleys, lakes, and fjords. The roads across the mountain ridge traverse the valleys, and hence can afford no standard by which to measure its height. Its elevation is estimated at from 2,000 to 4,000 feet in different localities. Such parts of the country as may justly be entitled plains (as, for instance, Romerike in east Norway, and Lister and Jæderen on the southwest coast) are exceedingly limited as to both number and extent. Hence the rivers are navigable only for short distances, and even then only exceptionally by large vessels. It is only in those comparatively frequent cases where the rivers expand into lakes that they can, strictly speaking, be navigated by ships. On the other hand, the waterfalls in Norway are exceedingly numerous, and many of them remarkable for their height, body of water, and great beauty.

The freshwater lakes of Norway must be generally regarded as mere river expansions. Hence they are, as a rule, long and narrow, and, to judge from the soundings hitherto made, exceedingly deep. The total surface area of all the freshwater lakes of Norway is estimated at 2,930 square miles, or 2.38 per cent. of the area of the land.

The numerous and in many cases very extensive fjords, as well as the height and contour of the country, give to the different parts of the coast of Norway a remarkably varied character. For long distances the mainland does not come into direct contact with the sea, girdled as it is by a belt of islands, holms, and skerries, more or less thickly set, which forms the so-called "skjærgaard" (fence of skerries) or outer coast. Between this wall of islets and the mainland, accordingly, extends a connected series of sounds—"leder" (roads), as they are called—of the greatest importance for coastal navigation, since they admit of the employment of smaller and weaker vessels. The total area of the islands of Norway amounts to 8,460 square miles.

Notwithstanding its great abundance of rocks, Norway cannot be said to be rich in valuable ores or minerals. Thus, for example, true coal does not occur; Jurassic has been found on Andöen, but only in seams

extremely limited in extent. Gold is met with very sparingly in veins of quartz at Eidsvold, in the rivers of Finmark, and along with silver in the Kongsberg mines. The latter metal is found as native silver in veins of calcareous spar at Kongsberg, where the state owns a silver mine of considerable value. Copper occurs in numerous localities, as Thelemark; Röros in the Thronthjem district, many parts of the west coast, more especially at Vigsnaes on Karmöen, and in northern Norway at Kaafjord in Alten. Nickel is produced in some parts from sulphureted iron ore, particularly on the island of Senjen in Tromsø amt. Iron ores are met with in southern Norway, particularly along the coast near Arendal.

Volcanoes, in a strict sense, and their subsequent results, such as hot springs, have not been met with in Norway.

The coldest parts of Norway, where the mean annual temperature is below 32° Fahr., are the highest regions of the country and the interior of Finmark (Karasjok, 26.4°); on the seashore it is only at Varanger Fjord that it falls below 32°. The highest mean annual temperature (44.6°) is that of Skudesnaes; and the outer coastal margin from the mouth of Sogne Fjord to Lindesnaes has a mean annual temperature of 44°. The interior of southern Norway and that of Finmark have the longest winter (200 days with a mean annual temperature of under 32°) and the lowest winter temperature, the mean temperature of the coldest day being under 14°. From the interior districts toward the coast the climate becomes everywhere milder in winter. Storms are frequent on the coast (thirty stormy days a year), rare in the interior (four stormy days a year). Their most frequent direction is the same as that of the prevailing winds, *viz.*, for the whole country on an average from the southwest, then from the west, and the northwest. They are most frequent in winter, particularly during December and January (four a month), rarest in summer (hardly one a month). Fog is most frequent on the west coast and the coast of Finmark in summer, rarest in winter. In the southeast part of the country the reverse is the case. In winter a frosty fog hangs over the inner extremities of the fjords when the cold is severe and the wind blows out from the land over the open water of the fjord.

The forest growth of Norway consists chiefly of pine and fir, which clothe the slopes of the mountain valleys, especially in northern Norway (as those of the Glommen and its tributaries, those of the Drammen, Laurvik, Skien, Arendal, and Christiansand districts, and those drained by the rivers disemboguing at Frederikshald). Extensive forests of coniferous trees are also found in Thronthjem stift and the amt of Nordland. The coniferous woods of Bergen and Tromsø stifts consist—with a solitary exception—of fir alone. The extreme limit of the fir belt in southern Norway is from 2,200 to 3,000 feet above the sea; throughout the Thronthjem region, from 1,600 to 2,000 feet; at Talvik in Alten (70° N. latitude) it does not exceed 700 feet. With the sole exception of the birch, none of the foliferous trees indigenous to the country form woods of great extent.

The vast fir and pine forests are still the haunts of the largest of European carnivoræ—the bear, the lynx, and the wolf. The numbers of the last-mentioned, however, have, in southern Norway, been steadily and one may almost say unaccountably decreasing during the last twenty years; and the wolf may be now regarded as the most rare of all Norwegian beasts of prey. In Finmark it still abounds, constituting the worst enemy to the herds of reindeer. The bear also is less frequently met with, a fact to be accounted for by the immense quantities of timber felled of late throughout the country.

The elk is not found in the west of Norway, but its place is partially taken by the red deer, which selects as its haunts the largest of the wooded islands on the coast and the numerous semi-insular projections of the mainland. The wild desolate wastes of the fjelds are the home of the glutton and the reindeer, the lemming and the polar fox. Large herds of reindeer still roam throughout the alpine region of the fjelds between eastern and western Norway, and on the Dovre mountains, the Rundane, and the highlands between Gudbrandsdal and Österdal, and Gudbrandsdal and Valdres; but this noble animal has become scarcer of late years. In some years, and in certain localities, the lemming makes its appearance in countless multitudes, to be attacked by its numerous enemies, particularly birds of prey, among which are the snowy and the short-eared owl; the common kestrel, too, and the rough-legged buzzard, are seen in large numbers at such times, sweeping over the wastes of the fjelds.

The sea that washes the shores of Norway abounds in fish; and hence the coast, with its numberless islands, holms, and skerries, is a favorite haunt for such birds and mammals as prey upon fishes and other marine animals. When the herring approaches the coast to spawn, it is hotly pursued by the whale; and in Finmark when shoals of capelan make for the coast in spring, accompanied by cod, which gorge themselves with this their favorite food, the fin-whale and the blue-whale are exceedingly numerous, and their presence has given rise to a most important branch of the fishing industry. The waters of the fjords, and the holms and islets of the coast abound in the spotted seal (*Phoca vitulina*), and the *Phoca barbata* is not uncommon in some localities on the outermost skerries.

Feathered game—capercalzie, black-cock, hazel grouse—is still abundant in the forests, though less plentiful now than formerly, owing to the reckless manner in which they have been destroyed by amateur sportsmen. The finest ptarmigan are found in the birch region of the fjelds; but in southern Norway they often prefer the more elevated tracts of the willow zone during summer, though even then they are most abundant in the birch zone. The marshy tracts of the fjelds are the breeding-grounds of numerous varieties of fen-fowl, the lapwing and the dotterel plover occurring in great numbers.

Of the various species of freshwater fish the *Salmonidae* are beyond comparison the most important to the inhabitants. In the more extensive of the lakes, which are generally of great depth, trout attain almost the size of salmon, weighing up to thirty pounds. In some lakes the red charr attains a weight of twelve pounds, as does also the Finmark variety of this fish, which, in common with the sea-trout, remains during most of the year in deep sea-water, ascending the rivers in the spawning season only.

The sea being very deep, both in the fjords and off the coast, such fishes and marine animals as affect great depths are there abundant. Some species are of great economic importance. On the banks off the coast of Finmark, at a depth of 150 to 200 fathoms, large numbers of the Greenland shark are annually captured, their livers yielding a large quantity of oil. During the first half of the present century the sunfish, or basking shark, abounded on the coast, its capture forming an important branch of the fishing industry. It is now but rarely met with, and the fishery has been discontinued. No species of fish can compare in point of importance with the herring and the cod, which, taken in immense quantities on the western coast, constitute one of the chief sources of national wealth.

The population of Norway on December 31, 1882,

was 1,913,000, and is now (1890) 1,990,000. Subjoined are the figures for each of the eighteen counties (amter) into which the kingdom is divided:—

Smaalenene.....	114,000	Stavanger	118,000
Akershus	100,000	Søndre Bergenhus....	121,000
Buskerud	104,000	Nordre Bergenhus....	88,000
Jarlsberg and Laurvik.	92,000	Romsdal	125,000
Bratsberg	87,000	Søndre Thronhjøm....	123,000
Hedemark.....	123,000	Nordre Thronhjøm....	84,000
Christian	113,000	Nordland.....	116,000
Nedenæs	79,000	Tromsø.....	60,000
Lister and Mandal....	77,000	Finmark.....	27,000

Of the towns the following seven had the largest population (Christiania and Bergen being each a separate amt):—Christiania, 139,407; Bergen, 43,026; Thronhjøm (1875), 22,152; Stavanger (1879), 23,500; Drammen, 19,582; Christiansand, 12,282; and Christian-sund, 9,025.

Norway is the most sparsely populated country in Europe, having an average of about eighteen persons to the square mile. According to the returns completed in 1875, the owners of real property in the rural districts numbered 173,183. An area of 24,713 English square miles of the southern stifts is estimated to be under wood, while the whole arable land of the country in 1875 amounted to 738 square miles.

The fisheries form one of the most important sources of the national wealth. In 1881 they employed upward of 120,000 men, and the aggregate profits were estimated at about \$6,000,000.

Manufacturing establishments numbered 2,628, employing an aggregate of 41,391 hands. The leading place here is taken by the sawmills, of which there were 112 driven by steam (3,402 hands) and 630 by water (4,274 hands). Next come 551 cotton-mills (2,037 workmen), 199 brickworks (3,540 workmen), 123 cod-liver oil works (598 workmen), 112 shipbuilding yards (2,388 workmen), and 27 wood-fiber factories (805 workmen).

Mines are a considerable source of wealth to the country. The foreign trade of Norway is steadily increasing. Its aggregate value in 1882 was estimated at \$80,000,000. The port of Christiania has the largest trade; next to Christiania come Bergen and Thronhjøm. The mercantile marine of Norway some years ago passed through a period of stagnation, but revived somewhat. In 1889 it consisted of 7,977 vessels (7,618 sailing-vessels and 359 steamers), with an aggregate tonnage of 1,520,407. The gross freight earned was \$26,000,000. The largest shipping ports are those of Stavanger (669 vessels, 120,017 tons), Arendal (412 vessels, 171,858 tons), Bergen (348 vessels, 84,870 tons), Christiania (318 vessels, 105,193 tons), and Drammen (281 vessels, 85,028 tons).

The Norwegian railways have a total length of 973 English miles. With improved means of communication the Norwegian postoffice has made corresponding advances. The government telegraphs had at the close of 1889 a line length of 4,609 miles.

As regards primary education Norway takes a leading place among the states of Europe. In the country districts 207,922 children were instructed in 6,408 schools by 3,374 teachers and 108 preceptresses; 40,826 children in the towns were instructed by 372 teachers and 367 preceptresses in 144 schools. There are, besides, 147 citizen-schools, middle schools, and higher schools, with a staff of 824 teachers and 466 preceptresses; the scholars numbered 16,800 (9,150 boys and 7,650 girls). The university, that of Christiania, has 50 professors and 1,000 students.

Service in the army or navy, without the right of providing a substitute, is obligatory on all males who have completed their twenty-third year; the only exemptions

are in favor of ecclesiastical functionaries, pilots, and the inhabitants of Finnmark. To the navy are drafted all conscripts who have made a voyage to foreign parts of at least twelve months, all conscripts from Nordland and Tromsø, and a certain number of those from southern Norway who are accustomed to the sea. The military schools are at Christiania. The average annual conscription is 6,300 men. The total establishment of the army in 1889 was 68,809 men, viz., infantry 60,672 (48,275 combatants), cavalry 2,735 (1,343 combatants), artillery 5,150 (2,867 combatants). The commissioned officers numbered 703. The numbers on a peace footing were—for the line 15,878 (war complement 3,203), for the reserve 17,089, for the landværn 12,846. There were also 532 musicians.

The navy is manned in part by volunteers. The term of service is from the age of twenty-two to that of thirty-five. The schools for naval instruction are at Horten, where also is the chief royal dockyard. The fleet consists of 49 steamers with 157 guns. There is also a torpedo service.

The constitution of Norway primarily rests on the "fundamental law," or *grundlov*, which was promulgated at Eidsvold on May 17, 1814, and afterward, on the union with Sweden, agreed to, with slight modifications, in Christiania on November 4th in the same year. To this must be added the Swedish succession ordinance of September 26, 1810, accepted by Norway in November, 1814, and the *rigsact*, or charter of union, of 1815. By the first-mentioned Norway is a free, independent, indivisible kingdom, united with Sweden under the same king. The form of government is a limited monarchy, and the throne is hereditary in the male line. Evangelical Lutheranism is the established religion. In their foreign relations the two kingdoms are regarded as one. The one cannot make war without the other, and there is a common diplomatic corps, which is controlled by the ministry of foreign affairs in Stockholm. In all other respects each kingdom is regarded as sovereign and independent. The executive is vested in the king, who comes of age when he is eighteen. His person is inviolable, and all responsibility for his official acts rests with the council of state. This body consists of two ministers, and at least seven (at present nine) councilors, chosen by the king from among the citizens, of at least thirty years of age. Formerly the government in Christiania was presided over by a governor, but this office was never filled after 1855, and in 1873 it was abolished, (on the accession of Oscar II.) Each of the seven councilors has charge of one of the seven state departments (finance, justice, home affairs, church, war, navy and postoffice, and audit). The king can declare war and conclude peace, make alliances and treaties, and has the supreme command of army and navy; but for offensive war the consent of parliament is necessary. The king appoints to all public offices, and can dismiss at pleasure his council of state and other government functionaries, the highest officials of church and state, the heads of the army, and the commandants of fortresses. He can also issue provisional ordinances relating to trade, taxation, industry, and legal procedure, provided they are not contrary to the fundamental law of the country and the laws agreed upon by parliament; these ordinances are in force till next meeting of parliament.

While the king has thus the executive power, the right of legislation and taxation is exercised by the people through their representatives in the parliament or *storting*, which statedly meets in Christiania in the beginning of February every year. The king can, however, when circumstances require it, summon an extraordinary *storting*. The elections are for a period of

three years. The number of members is, by a law passed in 1878, fixed at 114—thirty-eight from the towns and seventy-six from the country. The members are not chosen directly, but by electors nominated by the voters. Several little towns are grouped into one electoral district. In the country there is an elector every 100 voters in the parish (*herred*). The electors afterward meet in each county, and choose the number of members fixed by law. Only citizens who have the right to vote are eligible, and they must, moreover, be at least thirty years of age and have been ten years settled in the country. Every Norwegian citizen, not being a criminal or in foreign service, is entitled to vote, if he has passed his twenty-fifth year, has been settled in the country five years, and has certain property qualifications—a public appointment, ownership or tenancy of land, or, in towns, ownership of property worth at least 600 crowns (about \$165).

Immediately after the opening of parliament one-fourth of its members are elected to constitute the "upper house" or *lagthing*; the remaining three-fourths form the "lower house" or *odelsting*. In practice this means a division between the legislative and controlling powers of parliament. Every bill or proposed enactment must be introduced either by a member or by government through a councilor in the *odelsting*. If it passes it is sent to the upper house, and if carried there also the royal assent gives it the force of law. If rejected by the upper house it goes back, with or without remark, to the lower house, where it is again discussed. If again carried it is sent once more to the upper house, and if it fails to obtain the requisite majority of votes the whole parliament now meets, and two-thirds decide the motion. To give legal sanction to a resolution of parliament thus carried the royal assent is still required.

The royal veto in ordinary questions is not absolute; a resolution passed unchanged by three successive regular parliaments becomes law *ipso facto*; but it is otherwise where alterations in the fundamental law are involved. Parliament also fixes taxation, its enactments with regard to which continue in force only until the 1st of July of the year in which the next ordinary parliament meets. Parliament alone has control of the members of the council, of the supreme court of justice, and of its own members; for crimes in their public capacity these can be put on their trial at the instance of the lower house before the supreme court of the kingdom (*rigsretten*), which is composed of the supreme court of justice and the upper house of parliament. The proceedings of parliament and of its divisions are carried on, when not otherwise determined by special vote, with open doors, and published. The members of the council are not allowed to take part in the proceedings. By the fundamental law Norwegians only, with a few exceptions, are eligible for public appointments. The public debt in 1889 was \$40,000,000.

The early history of Norway is exceedingly obscure. The scanty allusions to Scandinavia and its inhabitants which we find in the classical writers refer to the inhabitants of Denmark and of the south of Sweden. The first mention of names which can be identified with any certainty as those of known Norwegian tribes is found in Jordanes, a writer of the sixth century. The traditions of the earlier times which are preserved in Norse literature can scarcely be said to afford any sure ground for history, for whatever truth may be in them seems to be almost hopelessly concealed beneath an overgrowth of mythological and genealogical legend.

Toward the end of the eighth century we first hear of that phase of history which made the Scandinavian peoples well known during the next 200 years to the

nations of northwestern Europe. In 787, if we may trust a record of later date, the ships of the Northern sea rovers first appeared on the English coast, and in 793 and 794 they plundered Lindisfarne and Monkwearmouth. Thenceforward we find them in continually increasing numbers on the coasts of Scotland and Ireland, in England and France, and on the southern coasts of the North Sea, isolated expeditions going as far as Spain and the Mediterranean.

About the end of the ninth century Norway first became a united kingdom, and from that time we have a comparatively full and authentic record of its history.

From the time of the union with the Swedish crown the history of Norway is bound up with that of the other Scandinavian countries. With Sweden she entered the Calmar union in 1397, but when that union was broken in the beginning of the sixteenth century she remained with Denmark, and during the whole time of union can scarcely be said to have had a history of her own. The Danish kings were accepted in Norway with only an occasional show of dissent and resistance. One of her oldest and most famous colonies, the Orkney and Shetland Islands, was, in 1468, given in pledge, never to be redeemed, to the Scottish king by Christian I. The commercial towns fell under the iron rule of the Hanseatic League, and all the old enterprise seemed to have perished. Intellectual life appeared to fall as low as commercial prosperity. The vigorous Norse-Icelandic literature was supplanted after the time of Hakon Magnusson by versions of foreign legends and history, but even that disappeared, and, as the manuscript copies grew scarcer, it appears as if for awhile the Norwegians had ceased to read as well as to write. The Reformation spread more slowly into Norway than into the other Scandinavian countries, and had to be encouraged by the Danish kings by methods not altogether dissimilar to those by which Christianity had at first been introduced. But better times began to dawn during the last century. Restrictions were removed from lands and the administration was improved. The material prosperity of the country rapidly increased and a new life began to appear.

By the terms of the peace of Kiel (January 14, 1814), Norway was to be transferred from Denmark to Sweden. The Norwegians were at first inclined to resist this, but their means of resistance were small and the Swedes offered liberal terms. In the same year the constitution was solemnly ratified, and Charles XIII. was taken as king. Since then the country has been peaceful and prosperous. The only serious political troubles have been those arising from the question whether the king has an absolute veto upon alteration of the fundamental law of the kingdom.

NORWEGIAN SEA. The sub-polar regions of the Atlantic lying between the Scandinavian peninsula and Greenland have been in recent years carefully investigated by Norwegian expeditions under Professors Mohn and Sars; and, as the sea immediately to the west of Norway has not hitherto been known by any distinctive name, Mohn has proposed the name of "Norwegian Sea"—a suggestion which has been now generally adopted. The Norwegian Sea, therefore, includes the whole of the region between Greenland and Norway, a portion of which, to the northwest of the island of Jan Mayen, is sometimes known as the Greenland Sea. The Norwegian Sea is a well-marked basin cut off from the Atlantic by submarine ridges connecting the north of Scotland, the Faroe Islands, Iceland, and Greenland. On the summit of these ridges there is an average depth of about 250 fathoms. Between Spitzbergen and Lapland there is a wide opening into the Barents' Sea, where the depth is from 100 to 200 fathoms.

Between Spitzbergen and Greenland a wide and deep opening extends into the frozen Arctic Ocean, with a depth of 2,500 fathoms. The surrounding land is almost everywhere high, rugged, deeply indented with fjords, and skirted with outlying islands, which are mostly composed of stratified rocks and ancient geological formations. Jan Mayen, situated near the center of the basin, Iceland, and the Faroe Islands are of volcanic origin.

NORWICH, a city of England, the capital of Norfolk. The municipal and parliamentary boundaries inclose an area of 7,472 acres; but the ancient walls (1294-1342), some portions of which remain, with their twelve gate-houses—the last demolished in 1808—were only four miles in circuit.

The textile manufactures of Norwich, once so important, have declined; and now its great industrial establishments are a mustard and starch works employing upward of 2,000 hands, three or four large breweries, and ironworks. Boots, clothing, vinegar, and agricultural implements are also made in large quantities. There is one daily paper, and eight others are published weekly. The corporation consists of a mayor, deputy mayor, and sheriff (elected annually), sixteen aldermen, and forty-eight councilors; and the city has sent two members to parliament since the reign of Edward I. The population has been successively (1801) 35,832, (1831) 61,110, (1871) 80,386, (1881) 87,842—males, 40,288; females, 47,554—in 20,764 houses (1881).

NORWICH, one of the county seats of New London county, Conn., lies sixteen miles from Long Island Sound, at the junction of the Yantic and the Shetucket to form the Thames, and thirteen miles north of New London. The greater part of the city is built on rising ground between the valleys of the confluent streams, and with its white and handsome houses has a highly picturesque effect. Besides the courthouse (1873), used for county, township, and city affairs, the more conspicuous edifices are the free academy (1856), the Park Church (Congregational), and Christ Church (Episcopalian). Among the numerous industrial establishments settled at Norwich, on account of the abundant water-power in the district, are cotton, wool, paper, and rolling mills (all on a very large scale), as well as factories for firearms, printing-presses, water-wheels, locks, stoves, belts, bolts, wood-type, carriages, etc. Steamers ply daily between the city and New York, and there is a thriving trade in coal, lumber, and general goods. The population of the town was 14,048 in 1860, 16,653 in 1870, and that of the city 16,192 (of the town 21,143) in 1890.

NORWOOD, a large suburban district of London, county of Surrey. It is divided into Upper, Lower, and South Norwood, all consisting principally of villa residences and detached houses inhabited by the better classes. The population of Norwood (area 1,009 acres) in 1871 was 12,536, and is now (1890) 27,000.

NORWOOD, a municipal suburb of Adelaide, South Australia, is situated about two miles northeast of the center of the city, with which it is connected by a tramway. Norwood along with Kensington forms a municipality, with an area of one and one-half square miles and a population of 18,000.

NOSE. See **SMELL**.

NOSSI-BÉ, an island off Passandava Bay, on the northwest coast of Madagascar, is situated 149 miles from Mayotte, and governed along with the smaller island of Nossi-komba, by a French commandant subordinate to the governor of Mayotte. Nossi-bé has an area of 481,845 acres (nearly 750 square miles), of which not more than 1,800 or 2,000 acres are planted with sugar-cane, coffee, etc. The population, consisting

mainly of Sakalavas, varies considerably in number. Hellville, the European chief town (so called after De Hell, governor of Réunion at the time of the French annexation), has from 1,200 to 1,500 inhabitants.

NOSTRADAMUS, the assumed name of MICHEL DE NOTREDAME, a French astrologer, who was descended from a family of Jewish origin, and was born at St. Remi in Provence, December 13, 1503. After completing a course of study in humanity and philosophy at Avignon, he entered the school of medicine at Montpellier, where he eventually took the degree of doctor of medicine in 1529. Shortly afterward he settled at Agen, and in 1544 he established himself at Salon near Aix, in Provence. Both at Aix and at Lyons he acquired great distinction by his devoted and skillful labors during terrible outbreaks of the plague, and he was already well known before he appeared in the character of a seer. In 1555 he published at Lyons a book of rhymed prophecies under the title of the *Centuries*, which secured him the notice of the superstitious Catherine de' Medici of France; and in 1558 he published a second and enlarged edition with a dedication to the king. The seeming fulfillment of some of his predictions greatly increased his influence, and Charles IX. named him his physician in ordinary. He died July 2, 1566.

NOTARY, or NOTARY PUBLIC. In Roman law the *notarius* was originally a slave or freedman who took notes (*note*) of judicial proceedings in shorthand or cipher. The notary of modern law corresponds rather to the *tabellio* or *tabularius* of Roman law than to the *notarius*. In the canon law the notary was a person of great importance, and it was a maxim of that law that his evidence was worth that of two unskilled witnesses. In most European countries he still holds something of his old position under the canon law. In France, for instance, a document attested by a notary is said to be "legalized," a term much too strong to express the effect of such attestation in England, where the notary public, in spite of his name, is not recognized as a public officer to such a degree as the notary in other countries.

In America the duties of a notary vary in different States. They are generally as follows:—To protest bills of exchange and draw up acts of honor; to authenticate and certify copies of documents; to receive the affidavits of mariners and draw up protests relating to the same; to attest deeds and other instruments; and to administer oaths.

NOTICE. The primary meaning of notice is knowledge (*notitia*), as in "judicial notice;" thence it comes to signify the means of bringing to knowledge, as in "notice to quit;" at last it may be used even for the actual writing by which notice is given. The most important legal uses of the word are judicial notice and the equitable doctrine of notice. Judicial notice is the recognition by courts of justice of certain facts or events without proof. Other common uses of the word are notice to quit, notice of dishonor, notice of action (generally necessary in case of a breach of duty created by statute), notice of trial, notice in lieu of service of a writ (where the defendant is a foreigner out of the jurisdiction), notice to produce, etc. Notice may be either express or constructive. The latter is where knowledge of a fact is presumed from the circumstances of the case, e.g., notice to a solicitor is usually constructive notice to the client. Notice may be either oral or written. It is usually advisable to give written notice even where oral evidence is sufficient in law, as in the case of notice to quit. The American use of notice is practically the same as in England.

NOTKER, a name of somewhat frequent occurrence

in the ecclesiastical history of the Middle Ages. Among those by whom it was borne two are specially distinguished. NOTKER BALBULUS (c. 840-912) was a native of northern Switzerland, and, having become a monk of the monastery of St. Gall, held the position of "magister" in its school for many years. He was canonized in 1513. NOTKER LABEO, also a monk of St. Gall, died on June 29, 1022. His translations of the Old Testament Psalms, the *De Consolatione* of Boetius, the *Categories* of Aristotle, and some other works into Old High German are of considerable philological interest.

NOTO, a city of Italy, in the province of Syracuse (Sicily), twenty-four miles southwest of Syracuse. Built on a new site after the earthquake of 1693, it is laid out in modern style, and contains a number of handsome mansions belonging to the provincial aristocracy. The population of the city was 15,925 in 1881; that of the commune, 16,590 in 1871, reached 18,239 in 1881.

NOTTINGHAM, or NOTTS, an inland county of England, is bounded north by Yorkshire and Lincolnshire, west by Derbyshire, south by Leicestershire, and east by Lincolnshire. It is of an irregular oval shape, its length from north to south being fifty miles, and its greatest breadth from east to west about twenty-five miles. The area is 527,752 acres, or nearly 825 square miles.

The surface, though for the most part low, generally presents a pleasant diversity of hill and dale. The northern part is included in the great plain of York, and in the extreme north there is some extent of marshes. The valley of the lower Trent and that of the Idle are also very flat. In the southwest, between Nottingham and Warsop, the undulations swell into considerable elevations, reaching near Mansfield a height of 600 feet. The district includes Sherwood Forest, of which, in 1609, there were 44,839 acres inclosed, 9,486 woods, and 35,080 waste. The county generally is finely wooded, although to the east of the valley of the Soar there is a considerable stretch of wolds. The principal rivers are the Trent, the Erewash, the Soar, and the Idle. The oldest rocks of the county are the Coal-measures, which, forming part of the Yorkshire, Nottingham and Derby coalfield, stretch in from Derby, occupying principally the district west of a line drawn from Nottingham to Kirkby, although coal is obtainable below the other rocks as far east as Lincolnshire, at a depth of probably less than 4,000 feet. The principal workable seams are the Top Hard, the Deep Soft, the Deep Hard, and the Kilbourne coal. In 1881 there were thirty-nine collieries, producing together 4,758,060 tons.

As the higher regions of Derby and Yorkshire attract the rain-clouds, the climate of Nottingham is much above the average in dryness, and on that account crops ripen nearly as early as in the southern counties. The soil of about one-half the county is gravel and sand, including Sherwood Forest, where it inclines to sterility, and the valley of the Trent, where there is a rich vegetable mold on a stratum of sand or gravel. The land along the banks of the Trent is equally suitable for crops and pasture. The farms generally are of moderate size, the great majority being under 200 acres. Considerable improvements have taken place in the farm buildings and cottages, most of them being now built of brick and tile. According to the agricultural returns for 1883, there were 454,217 acres, or nearly nine-tenths of the total area under crops.

Nottinghamshire has for more than a century been the center of the hosiery trade of England, and it is now equally famous for its lace manufactures. Besides the numerous silk-mills and worsted-mills, there are also cotton-mills, bleachworks, sailcloth-works, paper-works,

iron and brass foundries, engineering shops, chemical-works, maltworks, tanneries, and breweries.

The population, which in 1801 was 140,350, had increased in 1821 to 186,873, in 1851 to 270,427, in 1871 to 319,758, and in 1881 to 391,815, of whom 190,778 were males and 201,037 females.

NOTTINGHAM, a municipal and parliamentary borough of England, a county in itself and the chief town of Nottinghamshire, is finely situated on an acclivity of rock rising above the Trent and on several railway lines, 128 miles north-northwest of London and 15½ east of Derby. It is connected both with the Midland and Great Northern railway systems, while by means of the Trent, the Grantham Canal, and the Nottingham, Cromford, and Erewash Canal it has convenient water-communication with the counties of Lincoln, Leicester, Stafford, and Derby. Though the older streets are narrow and irregular, the rapid increase of the town has almost completely altered its character in this respect, most of the new streets being spacious, and some of them containing fine ranges of buildings. A new bridge across the Trent was opened in 1871. Nottingham possesses one of the largest market-places in England, its total area being about five and one-half acres. There are three old parish churches—St. Mary's Church, a fine cruciform structure, lately restored, now entirely in the Perpendicular style, and possessing a fine tower rising from the center in two stages, crowned with battlements and pinnacles; St. Peter's, which was nearly all rebuilt in the Perpendicular style in the fifteenth century, and has been enlarged at different times; St. Nicholas, a plain building in red brick with stone facings, erected in 1676. There are numerous fine modern churches, but special mention may be made of the Roman Catholic cathedral of St. Barnabas, in the Early English style, by Pugin, erected in 1842-44. Among the secular buildings are the exchange hall, which is now used as the town-council chamber; the town or guild hall (rebuilt 1741), a plain stuccoed building; the municipal offices (formerly the postoffice, 1848), in the classic style, with a Doric portico; the corn exchange; the county hall; the new postoffice, erected in 1868 in the Italian style; the people's hall (1754); the Albert Hall, for concerts (1876), a Gothic building with a tower; and the masonic hall (1880). The town also possesses a free museum of natural history, a mechanics' institute, and a free public library with nearly 40,000 volumes. Among the educational establishments the principal are University College, for which a splendid range of buildings was opened in 1881; the free grammar school, founded in 1513; the Nottingham High School for girls; the bluecoat school, founded in 1723; the people's college, founded in 1846 for children of the working classes; the Congregational institute for the education of students; and the Nottingham school of art, for which a fine building was erected in 1865 in the Italian style, and which is attended by over 500 students. There are a large number of benevolent institutions.

Nottingham has been a manufacturing town for more than 600 years, and toward the close of the last century became an important seat of the stocking trade. It was here that Richard Arkwright, in 1769, erected his first spinning frame, and here also Hargreaves had the year previously removed with his spinning jenny after his machine had been destroyed by a mob at Blackburn.

The population increased from 31,638 in 1801 to 79,604 in 1851, to 86,621 in 1871, and to 111,648 in 1881, of whom 51,892 were males and 59,756 females.

NOTTINGHAM, EARLS OF. HENEAGE FINCH, first earl, lord chancellor of England, was descended

from an old family. In the register of Oxford university he is entered as born in Kent, December 23, 1621, and probably his native place was Eastwell, in that county. He was educated at Westminster and at Christ Church, Oxford, where he remained till he became a member of the Inner Temple in 1638. He was called to the bar in 1645, and soon obtained a lucrative practice. He was chosen a member of the convention parliament of April, 1660, and shortly afterward was appointed solicitor-general, being created a baronet the day after he was knighted. In May of the following year he was chosen to represent the university of Oxford, and in 1665 the university created him a D.C.L. In 1670 he became attorney-general, and in 1675 lord chancellor. He died December 18, 1682.

DANIEL FINCH, born in 1647, second earl, son of the preceding, entered parliament for Lichfield in 1679. He was one of the privy councilors who, in 1685, signed the order for the proclamation of the duke of York, but during the whole of the reign of James II. he kept away from the court. At the last moment he hesitated to join in the invitation to William of Orange, and after the abdication of James II. he was the leader of the party who were in favor of a regency. He declined the office of lord chancellor under William and Mary, but accepted that of secretary of state, retaining it till December, 1693. Under Anne he, in 1702, again accepted the same office in the ministry of Godolphin, but finally retired in 1704. On the accession of George I. he was made president of the council, but in 1716, he finally withdrew from office. He succeeded to the earldom of Winchelsea September 9, 1729, and died January 1, 1730.

NOVALIS. See HARDENBERG.

NOVARA, a city of Italy, the chief town of a province, stands between the Agogna and the Terdoppio, on a hill 545 feet above sea-level, in the plain between the Sessia and the Po. It is an important railway junction, thirty miles west of Milan, on the main line from Turin to Venice, which there connects with the continuation of the St. Gotthard line and the Simplon route, as well as with a line to Alessandria and Genoa. Previous to 1830 Novara was still surrounded by its old Spanish ramparts, which were entered by only four gates, and gave the place a heavy appearance from the outside; it is now an open, modern-looking town. Besides being the largest grain market in the northwest of Italy, Novara trades in silk, linen, etc., and manufactures cotton, waxcloth, pottery, and starch. The communal population was 29,516 in 1871, and 33,077 in 1881; that of the city was 15,232 (or, with its suburbs, S. Martino, S. Andrea, S. Agabio, Bicocca, and Torriori, 26,206) in 1881.

NOVA SCOTIA, originally Acadia, a province of the Dominion of Canada, is composed of the peninsula proper and the adjoining island of CAPE BRETON (*q.v.*), which is separated from the mainland by the Gut of Canso. It is bounded on the north by Northumberland Strait (which divides it from Prince Edward Island) and the Gulf of St. Lawrence, northeast, southeast, and south by the Atlantic Ocean, and west by the Bay of Fundy and New Brunswick, being connected with the latter province by a narrow isthmus thirteen and a half miles wide. The extreme length from southwest to northeast is 350 miles, the breadth 120 miles, and the area 20,907 square miles (13,382,003 acres).

The province is intersected by chains of lofty hills, in most instances running parallel with the coast-line. The Cobequid Mountains, stretching in a long line from east to west and terminating in Cape Chignecto, form the chief ridge. Several of the elevations are as high as 1,100 feet, and are cultivable almost to their summits.

Lying on each side of this range are two extensive tracts of arable land which yield profitable crops. A sharply-outlined ridge of precipices runs for 130 miles along the Bay of Fundy from Briar Island at the farthest extremity of Digby Neck to Capes Split and Blomidon. Here and there masses of trap rocks, averaging from 200 to 600 feet in height and crowded with stunted firs, overhang the coasts. Beyond them lies the garden of Nova Scotia, the valley of the Annapolis, full of varied scenery, and unrivaled for its fruit, flowers, and cereals. The general slope of the country is southeasterly, in which direction there are several chains of lakes, the source of many rivers and streams of moderate length. The southeastern coast is remarkable for its harbors, twelve of which are capable of affording shelter to ships of the line, while between Canso and Halifax, a distance of 110 miles, there are fourteen ports which possess ample accommodation for merchantmen of average size. The principal inlets are Bay Verte, Tatamagouche, and St. George's Bay, in Northumberland Strait; Chedabucto Bay, at the head of the Gut of Canso; Halifax Harbor, Margaret's and Mahone Bays, on the southeast coast; St. Mary's Bay, on the southwest; Annapolis Basin, Minas Basin and Channel, and Cobequid Bay, on the west. Of these the most remarkable is Minas Basin, the eastern arm of the Bay of Fundy; it penetrates some sixty miles inland, and terminates in Cobequid Bay, where the tides rush in with savage impetuosity, rising sometimes as high as sixty feet, while on the opposite coast in Halifax Harbor, the spring tides scarcely exceed seven or eight feet. All along the coast of Nova Scotia there are many small islands, the southeast shore being literally studded with them. The chief are Caribou and Pictou, in Northumberland Strait; St. Paul, Scatari, and Isle Madame, off the coast of Cape Breton. Sable, a dangerous and sandy island, almost barren, lies 150 miles east of Halifax, and has long been noted as the scene of fearful shipwrecks. Its length is twenty-five miles by about one and one-half in breadth, the eastern end being in $43^{\circ} 59'$ N. latitude and $59^{\circ} 45'$ W. longitude. Other islands are Cape Sable, Seal, and Mud, in the south, and Long Island, at the entrance of St. Mary's Bay. The principal capes (apart from those of Cape Breton) are Malagash, John, and St. George, on the northern coast; Porcupine, Canso, Sambro Head, Pen-nant Point, Crown Point, and La Have, on the southeast; Sable, on the south; St. Mary, Split, Chignecto, and Blomidon, on the west. The interior of the country is traversed and watered by many rivers and lakes, which cover an estimated area of 3,000 square miles. The rivers are, with few exceptions, navigable for coasting vessels for distances averaging from two to twenty miles. The principal are the Annapolis, Abon, Shuben-acadie, East, Middle, and West, St. Mary's, Musquodoboit, La Have, Mersey. The largest lake is Lake Rossignol, situated in Queen's county, and more than twenty miles long. Ship Harbor Lake, fifteen miles in length, and Grand Lake are in Halifax county, College Lake is in the eastern part of the peninsula. The Bras d'Or Lake (Cape Breton) may be best described as an imprisoned sea. It is fifty miles long and of great depth, bordered by the counties of Victoria, Inverness, Richmond, and Cape Breton. The Carboniferous plain of New Brunswick is connected with that of Nova Scotia at its eastern extremity. The coalfields of the latter are especially valuable and productive. They are situated in Cape Breton, Cumberland, Pictou, Inverness and Richmond counties. In 1882 there were twenty-one collieries in operation, which produced 1,365,811 tons of coal, consumed principally in Quebec, New Brunswick, Newfoundland, Prince

Edward Island, and the United States. About 4,235 persons are employed in this industry. The coal is bituminous and very rich in quality. In the Carboniferous areas there are immense deposits of pyroschist or bituminous shale, "capable," says Dawson, "of yielding as much as sixty-three gallons of oil, or 7,500 feet of illuminating gas, per ton. Owing to the great cheapness of petroleum little attention has been paid to these shales for some years, but it is likely that they will before long again be in demand."

Gold is found in workable quantities, the production in 1886 being 23,362 ounces. The gold district includes Caribou, Gay's River, Montagu, Oldham, Renfrew, Sherbrooke, Stormont, Tangier, Uniacke, Waverley, Wine Harbor, and unproclaimed—thirty mines in all. Iron ore abounds also in profitable quantities, and of excellent quality; the production in 1886 was 14,388 tons. Other minerals, such as manganese ore, barytes, etc., abound. A fair business is annually done in coke, fireclay, building-stone, and grindstones. Some veins of copper, silver, lead, and galena, especially rich in quality, exist. There are many curious and beautiful fossils, besides amethysts, agates, chalcedonies, jaspers, cairngorms, etc.

The climate of Nova Scotia somewhat resembles that of New Brunswick. There are extremes of heat and cold, and sudden changes of temperature, varying sometimes in one day as much as 50° . Considering its northern latitude, it is remarkably temperate on the whole. The extreme of cold is about 20° below zero in the depth of winter, and the greatest heat is 98° .

Nova Scotia is a valuable agricultural country; wheat, oats, rye, barley, buckwheat, Indian corn, potatoes, turnips, beets, tomatoes, etc., grow in abundance, while apples, pears, plums, cherries, strawberries, raspberries, cranberries, gooseberries, currants, and other fruits ripen to perfection. The orchards of Annapolis and King's counties extend along the roadsides for upward of fifty miles. The soil is of various degrees of fertility. The intervale lands, which form an extensive part of the country, are rich, and yield largely. The uplands, lying between the hilly sections and the rivers, are of moderate capacity. The high lands are as productive as the intervalles.

The forests of Nova Scotia are extensive and valuable, the principal trees found in New Brunswick also growing in the sister province. They are chiefly pine, oak, tamarack, birch, maple, hemlock, spruce, butternut, ash, etc. The yield of timber is very great, the shipments in 1881 amounting in value to \$1,587,941.

Nova Scotia is not strong as a manufacturing country, but every year some new industries are added to the list. Coarse "homespun," coarse flannels, bed-linen, blankets, carpets, and tweeds are made in considerable quantities. Tanning is extensively carried on, and there are several factories where household and other furniture, agricultural implements, boots and shoes, saddlery, harness, tobacco, printing and wrapping paper, machinery, nails, pails and woodenware, fuse, gunpowder, carriages, and sleighs, etc., are made.

Next to Newfoundland, Nova Scotia possesses the largest and most valuable fisheries in British North America. Along the entire coast, extending over 1,000 miles, food fish of almost every description (salmon, trout, cod, halibut, haddock, bass, mackerel, herring, shad, lobsters, etc.), may be taken. Immense quantities of these are shipped to the West Indies, the United States, various ports in Canada; and of late years several varieties have been welcomed in British markets. About 19,000 men are employed in this industry.

Most of the principal birds of North America are to be found in Nova Scotia, and the game of the country includes moose, caribou, duck, teal, geese, woodcock,

partridge, snipe, plover, etc. The game laws are very strict, and are rigidly enforced. The wild animals remaining in the province are bears, wolves, foxes, wildcats, and a few others.

Nova Scotia is well furnished with railways, there being over 600 miles in operation. The roads of Nova Scotia are good and well maintained. Telegraphic lines are established nearly all over the province, and connect with the United States system.

The executive authority is in the hands of a lieutenant-governor and a council of eight members, four with portfolios and four without. Thirty-eight representatives are elected every four years to the house of assembly, and twenty legislative councilors are appointed for life by the local government. The lieutenant-governor is appointed by the governor-general of Canada in council. The system of administration is known as responsible government. The province returns twenty-one members to the Dominion House of Commons, and ten senators are appointed by the crown in the senate of Canada. They hold their positions for life. The province has the right to make its own civil laws, but in all criminal cases the form which obtains in all the courts is the criminal law of the Dominion. The judiciary consists of a chief justice, an equity judge, and five puisne judges, a supreme court having law and equity jurisdiction throughout the province, a vice-admiralty court, and a court of marriage and divorce. In each county there is a court of probate. There are also seven county-court judges.

Nova Scotia forms the ninth military district in the militia of Canada. The established strength of the active force by arms is composed of one troop of cavalry, one field battery of artillery, seventeen batteries of garrison artillery, nine battalions of infantry and rifles; total, 318 officers, and 3,638 non-commissioned officers and men. The period of service in time of peace is three years. British regiments of the line are also stationed at Halifax.

The public revenue of the province is a little more than half a million dollars annually, and the expenditure is about the same.

There are two Roman Catholic dioceses in Nova Scotia—the archdiocese of Halifax and the diocese of Arichat; the clergy of the two combined number seventy-six. A Church of England see was established at Halifax in 1787; the bishop, who has jurisdiction in Prince Edward Island also, has under him an archdeacon and eighty-five clergymen. The synod of the maritime provinces in connection with the Presbyterian Church in Canada includes 101 ministers in Nova Scotia. The Methodist Church has 100 clergymen and supernumeraries, and the Baptist denomination has 104. The free-school system is in operation, the whole community paying for its maintenance. The public charitable institutions receiving aid from the province are the insane asylum, poor's asylum and provincial city hospital, blind asylum, transient poor and visiting dispensary, and the deaf and dumb asylum, which is also helped by the New Brunswick Government. Several other institutions are maintained by societies and the benevolence of private individuals. The total population is 440,572, including 220,538 males and 220,034 females. In 1871 the population was 387,800. There are 2,125 Indians in Nova Scotia, principally Malicites and Micmacs. The inhabitants consist chiefly of Scotch, English, Irish, American, German, Acadian French, Dutch, freed negroes, of whom there are 7,062, and various other nationalities.

Besides Halifax, the capital, of which the population is 36,100, the chief towns are Pictou (3,403), New Glasgow (2,595), Sidney (Sydney), C. B. (3,667), North

Sydney (5,484), Yarmouth (6,280), Liverpool (3,000), and Lunenburg (4,007). Windsor (3,019), possessing one of the principal colleges in the province, is also the center of a large trade in gypsum. Annapolis, formerly Port Royal, Truro, Amherst, Antigonish, and Pugwash are also rising and thriving towns.

Nova Scotia was first visited by the Cabots in 1497, but it was 1604 before any attempt at colonization by Europeans was made. This was the expedition headed by De Monts, a Frenchman, which tried to form settlements at Port Royal, St. Croix, and elsewhere, and endured severe hardships until 1614, when the English colonists of Virginia made a descent upon them, claimed the territory in right of the discovery by the Cabots, and expelled them from the soil. In 1621 Sir William Alexander obtained a grant of the whole peninsula, and it was named in the patent Nova Scotia instead of Acadia, the old name given the colony by the French. Alexander intended to colonize the country on an extensive scale, but the attempt was frustrated (1623) by the French. During the reign of Charles I. the Nova Scotia baronets were created, and their patents ratified in parliament. Their number was not to exceed 150, and in exchange for their titles and grants of land they agreed to contribute aid to the settlement. Cromwell dispatched a strong force to the possession in 1654. In 1667 it was ceded by the treaty of Breda to the crown of France. But the restless English colonists, unmindful of treaty obligations, attacked the French from time to time at various points, until, in 1713, the latter relinquished all claim to the country. England neglected it till 1749, when, the designs of the French again becoming marked, the Government made strenuous exertions to induce British settlers to go there. More than 4,000 emigrants, with their families, sailed for the colony; and Halifax was founded. But the French settlers, who enjoyed privileges as neutrals, still embraced a considerable portion of the population, and, with their allies the Indians, proved exceedingly troublesome to the English. They were finally expelled; and, in 1758, a constitution was granted to Nova Scotia. By the treaty of Paris, in 1763, France resigned all pretension to the country. In 1784 New Brunswick and Cape Breton were separated from Nova Scotia; but, in 1819, the two latter divisions were reunited, and in 1867 they became part of the Dominion of Canada.

NOVATIANUS, Roman presbyter, and one of the earliest antipopes, founder of the sect of the Novatiani or Novatians, was born about the beginning of the third century. On the authority of Philostorgius, he has often been called a native of Phrygia, but perhaps the historian intended by this nothing more than to indicate the Montanistic complexion of Novatian's creed. Of the facts of his life very little is known, and that only from his opponents.

NOVATION is a term derived from the Roman law, in which *novatio* was of three kinds—substitution of a new debtor (*expromissio* or *delegatio*), of a new creditor (*cessio nominum vel actionum*), or of a new contract. In American law, as in English, the term is something of a novelty, except in Louisiana, the only State where the civil law prevails.

NOVA ZEMBLA, or, more correctly, NOVAYA ZEMLYA (*i.e.* "New Land"), is a large island surrounded by many small ones, situated in the ARCTIC OCEAN, and belonging to the Russian empire. It has the shape of an elongated crescent, 600 miles in length, with an average width of 60 miles, and an estimated area of 40,000 square miles, separating the Kara Sea on the east from that part of the Arctic Ocean which is often called Barents' Sea. The northeastern extremity of Novaya Zemlya lies a little to the west of the meridian

of the peninsula of Valmal, from the extremity of which it is only 160 miles distant. Its southern part, bending toward the southeast, appears as a continuation of the Vaigatch (Vaygach) Island, from which it is separated by the Kara Strait, thirty miles in width—the island itself being separated from the continent by the narrow Ugrian Strait, only seven miles broad. Novaya Zemlya is cut through about the middle by a narrow winding channel, the Matotchkin (Matochkin) Shar, which also connects the Arctic Ocean with the Kara Sea.

While the eastern coast runs as a regular curve, with deeper indentations only in its middle, the western is deeply indented by numerous and in some cases fjord-like bays, studded, like the rest of the coast, with many islands.

The interior of Novaya Zemlya is almost unknown; still, the broad features of its structure can be inferred from data obtained at various points on the coast.

Though milder than that of northeastern Siberia, the climate of Novaya Zemlya is colder even than that of Spitzbergen. Grass does not grow to any extent except in Goose Land, where the soil is covered with finer debris. Elsewhere even the leaved lichens are precarious, though the leather lichens flourish, especially the *Vermicaria geographia*.

The desolate interior shows hardly a trace of animal life, save perchance a solitary vagrant bird, a few lemmings, an ice-fox, a brown or white bear, and at times immigrant reindeer. Even insects are few; the very mosquitoes of the tundras are wanting, and only a solitary bee flies among the scanty flowers. The seacoast, however, is occupied by countless numbers of birds, which come from the south for the breeding season, and at certain parts of the seacoast the rocks are covered with millions of *Uria troile*, and the air is resonant with their cries, while numberless flocks of ducks, geese, and swans swarm every summer on the valleys and lakes of the southern part of the island. Whales, walruses, seals, and dolphins are still abundant. Only two species of fish are of any importance—the *goltsy* (*Salmo alpinus*) in the western rivers, and the *omul* (*Salmo omul*) in the eastern.

The numbers of sea mammals in the sea around Novaya Zemlya and the vast quantities of birds attracted Russian hunters as soon as they became acquainted with the northern Ural, and even in the sixteenth century they had extended their huts to the extreme north of the island. Many of them wintered for several consecutive years on Novaya Zemlya without suffering great losses from scurvy; but no inhabitants have ever tried to establish themselves permanently on the island. The hunters were very often extremely successful; but the industry has always been subject to great vicissitudes. During the last twenty-five years the Archangel and Kola hunters have but rarely visited Novaya Zemlya; on the other hand, both it and the Kara Sea are now more and more visited by Norwegians. A few Samoyede families, recently settled by the Russian Government at Karmakuly, have remained there for several consecutive years, living chiefly by hunting the reindeer which abound on the eastern coast, and of which two varieties are distinguished, one like that of Spitzbergen.

Novaya Zemlya seems to have been known to Novgorod hunters in the eleventh century; but its geographical discovery was four centuries later, at the time of the great movement for the discovery of the northeastern passage.

NOVEL. See ROMANCE.

NOVELLO, VINCENT, an artist whose efforts to diffuse an increased taste for classical music in England fifty years ago have been crowned with permanent suc-

cess, was born in London September 6, 1781. He was organist at different times of the Sardinian, Spanish, and Portuguese chapels, and of St. Mary's chapel, Moorfields. He was an original member of the Philharmonic Society, of the Classical Harmonists, and of the Choral Harmonists. He composed an immense quantity of sacred music, much of which is still popular. Novello died at Nice on August 9, 1861.

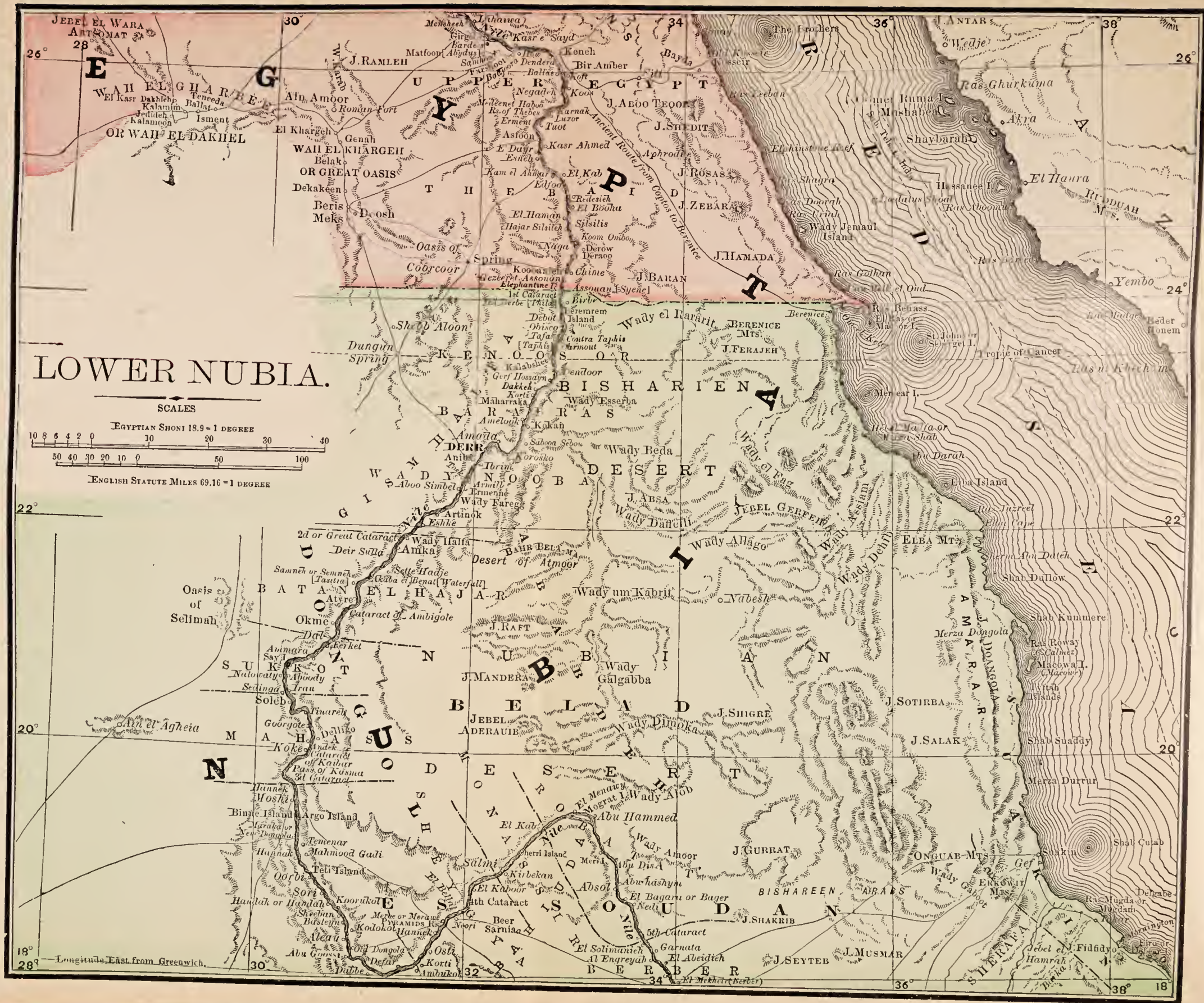
NOVEMBER (or *Novembris*, sc. *mensis*, from *novem*), the ninth month of the old Roman year, which began with March. By the Julian arrangement, according to which the year began with January 1st, November, while retaining its old name, became the eleventh month and had thirty days assigned to it. The 11th of November was held to mark the beginning of winter (*hiemis initium*); the sacred banquet called "epulum Jovis" took place on the 13th. In the calendar of the first French republic November reappeared partly as Brumaire and partly as Frimaire.

NOVERRE, JEAN GEORGES, an artist to whom the action and music of the modern ballet may almost be said to owe their existence, was born in Paris April 29, 1727. He first performed at Fontainebleau in 1743, and in 1747 composed his first ballet for the Opéra Comique. In 1755 he was invited by Garrick to London, where he remained two years. In 1775 he was appointed *Maître des Ballets* at the Académie; this post he retained until the Revolution reduced him to poverty, which he endured until his death, at St. Germain, in 1810.

NOVGOROD, a government of northwestern Russia, bounded on the west and north by St. Petersburg and Olonetz, on the southeast by Vologda, Yaroslavl, and Tver, and on the southwest by Pskov, has an extreme length from southwest to northeast of 400 miles, and an area of 47,240 square miles. Its southern part is occupied by the Valdai or Alaun plateau, which has the highest elevation of middle Russia (800 to 1,000 feet), and contains the sources of all the great rivers of the country. It is deeply furrowed by valleys with abrupt slopes, which give it the aspect of a highland region, and descends rapidly toward the valley of Lake Ilmen in the west, which is only 107 feet above the sea-level. The northeastern part of the government belongs to the lake district of northwestern Russia. The chief river is the Volkhoff, which flows from Lake Ilmen into Lake Ladoga. Other navigable rivers are the Syas, also flowing into Lake Ladoga, and the Sheksna and the Mologa, tributaries of the Volga. A brisk traffic is steadily carried by the Novgorod rivers, as all boats from the Volga to St. Petersburg pass through this government, while the goods embarked within the province itself amount to more than 7,000,000 hundredweights, worth from 6,000,000 to 7,000,000 rubles.

The climate is very harsh, the yearly average temperature at Novgorod being only 38.8° Fahr. Neither gardening nor the raising of cattle is very flourishing; in 1877 there were only 212,000 horses, 364,000 cattle, and 253,000 sheep. A number of petty trades are successfully carried on in the villages, all kinds of wooden wares being made and exported; the preparation of timber, pitch, tar, and charcoal is general, and shipbuilding is widely diffused in several districts. The fisheries on the great lakes are valued at 170,000 rubles annually, and, owing to the proximity of the capital, hunting is still profitable. But the greater number of the inhabitants are dependent on the river-boat traffic; and nearly one-fourth of the able-bodied male population are driven in search of work to other parts of Russia. The Novgorod carpenters and masons still maintain their old-established renown. The industrial





establishments are few. Trade, which is animated in several towns and at several points of the river-system, is chiefly in grain and timber, and in manufactures and grocery wares from St. Petersburg. The fairs are numerous, and several of them show considerable returns. The inhabitants are almost exclusively Great Russians. They belong mostly to the Greek Church, but there are many Nonconformists. Lutherans and Catholics number respectively 4,000 and 2,000. Novgorod, apart from the usual schools and gymnasiums, is better provided with educational institutions than many other governments of Russia, and, through the successful efforts of its *zemstvo*, primary education is more widely diffused in the villages. The government is but thinly inhabited, the population (1,011,500 in 1870) being only 1,090,000 in 1884. The chief towns of the eleven districts are: Novgorod, Borovichi (10,000 inhabitants), Byelozersk (6,000), Tcherepovets (3,600), Demiansk (1,500), Kiriloff (3,200), Krestsy (3,200), Staraya Russa (6,000), Ustyuzhna (7,000), and Valдай (3,800).

NOVGOROD, capital of the above government, is situated 119 miles to the south of St. Petersburg, on the low flat banks of the Volkhoff, some two miles below the point where it leaves Lake Ilmen. The present town is but a poor survival of the wealthy city of mediæval times. It consists of a kremlin (old fortress) and of the city, which stands on both banks of the river, here connected by a handsome bridge.

NOVI, or (to distinguish it from Novi di Modena, etc.) NOVI LIGURE, a city of Italy, in the province of Alessandria (Piedmont), at the foot of the Apennines and on the edge of a fertile plain, about twenty miles south of the river Po. It is of importance mainly as the meeting-place of the railways from Alessandria, Genoa, and Piacenza, and is one of the leading seats of the silk industry in Italy. The population of the city was 9,917 in 1881; that of the commune 11,445 in 1861, and 13,783 in 1881. In August, 1799, was fought the great battle of Novi, in which the French under Joubert were defeated by the Russians under Suwaroff, and in November of the same year there was a lesser conflict, in which the French proved victorious over the Austrians.

NOVIBAZAR, NOVIPAZAR, or YENIPAZAR (*i.e.*, New Market), on the Rashka, a tributary of the Ibar and subtributary of the Danube, is the chief town of a sanjak in the Turkish vilayet of Bosnia (formerly of Kossovo), which was occupied by Austria-Hungary in 1879 in accordance with the terms of the treaty of Berlin. Owing to the configuration of the country it is a point of great strategical importance, commanding the lines of communication between Bosnia and Rumelia, and between Servia and Montenegro. Population (1890), 12,000.

NOVO-BAYAZET, or NOVUII BAYAZET, a town of trans-Caucasian Russia, at the head of a district (area 2,390 square miles, population 67,800) in the Erivan government, sixty miles east-northeast of Erivan, and about four east of Goktchi Lake, lies 5,870 feet above the sea, on the rocky ravine of the Kavar-tchai.

NOVOGEORGIEVSK, a town and a fortress of Russia. (1) The former, usually known under the name of Kriloff, in the government of Kherson, district of Alexandriya, stands at the junction of the Tyasmin with the Dnieper, nine miles to the northwest of the Krementchug railway station. Its fort was erected by the Poles in 1615 to protect the passage across the Dnieper, and to guard the steppe on the left bank of the river. (2) NOVOGEORGIEVSK, or Modlin, is a first-class fortress of Russia in Poland, at the junction of the Nareff with the Vistula, nineteen miles to the northwest of Warsaw.

NOVOMOSKOVSK, a district town of Russia, in the government of Ekaterinoslaff, nineteen miles to the northeast of the capital of the province. The very fertile surrounding country was rapidly colonized, and now has several villages each of more than 5,000 and one above 10,000 inhabitants. The population of Novomoskovsk, which numbers 11,000, is chiefly engaged in agricultural pursuits.

NOVOTCHERKASSK, capital of the province of the Don Cossacks, is situated 737 miles south-southeast from Moscow, and 40 miles from the sea of Azof. The population of the town is 34,000.

NOWGONG, or NÁOGÁON, a district in the chief-commissionership of Assam, India. The district, which has an area of 3,417 square miles, consists of a wide plain much overgrown with jungle and canebrakes, intersected by numerous offshoots and tributaries of the Brahmaputra, and dotted with shallow marshes. It is estimated that about a hundred minor streams become navigable in the rainy season. The Míkír Hills cover an area of about sixty-five miles by thirty-five in the south of the district; the highest peak is about 3,500 feet. The slopes are very steep, and are covered with dense forest. Wild beasts of all kinds abound. The population in 1881 was 310,579, of whom about 12,000 were Mohammedans and the rest mainly aborigines or semi-Hinduized aborigines and Hindus in about equal proportions.

NOY, WILLIAM, attorney-general, was born in Buryan, Cornwall, England, in 1577, his father belonging to a family whose pedigree is included in the visitation of Cornwall in 1620. He matriculated at Exeter College, Oxford, April 27, 1593. His legal career began at Lincoln's Inn, and throughout life he was a diligent student of the grounds and precedents on which English law is based. From 1603 until his death in 1634 he was elected, with one exception, to each parliament, sitting invariably for a constituency of his native county.

NOYON, a city of France, department of Oise, sixty-seven miles north-northeast of Paris by the railway to Brussels, is built at the foot and on the slopes of a hill, and traversed by a small stream, the Verse, which joins the Oise a mile farther down. The old cathedral of Notre Dame, constructed during the latter half of the twelfth century, is a fine example of the mixture of Romanesque and Gothic architecture. The population of the commune and that of the city were respectively 6,268 and 5,236 in 1872, and 6,252 and 5,780 in 1881.

NUBIA, a country of northeast Africa, bounded on the north by Egypt, on the south by Abyssinia, Senaar, and Kordofan, and on the east and west by the Red Sea and the Libyan Desert respectively. It thus comprises the whole of the Nile valley, from Assuan (Oswán, Syene) near the first cataract southward to Khartúm at the confluence of the White and Blue Niles, stretching in this direction for about 560 miles between 16° and 24° N. latitude, and for nearly the same distance east and west between 31° and 39° E. longitude. But Nubia has at no time formed a strictly political, ethnical, or even administrative expression. Unless it can be identified with the Nob or Nub—that is, "Gold"—region of the hieroglyphic records, the term was unknown to the ancients, by whom everything south of Egypt was vaguely called Ethiopia, the land of the dark races. It is first associated historically, not with any definite geographical region, but with the Nobatæ, a negro people removed by Diocletian from the western oasis to the Nile valley above Egypt (Dodecaschoenus), whence the turbulent Blemmyes had recently been driven eastward. From Núba, the Arabic form of the name of this people, comes the modern Nubia, a term about

the precise meaning of which no two writers are of accord. Locally it is restricted to a comparatively small district, the Wády al-Núba, reaching from Sebú' along the Nile southward to the north frontier of Dongola. Officially it finds no recognition as an administrative division of the khedive's possessions, the region commonly understood by Nubia, as above roughly defined, being completely absorbed for administrative purposes, partly in the government of Upper Egypt, but mainly in that of Egyptian or Eastern Sudan (Soudan). Within these two governments it comprises the whole of the four mudírihs (provinces) of Berber, Táká, Dongola (Donkola), and Suákin (more correctly Sawákin), besides parts of Massowah, Khartúm, and Esneh (Upper Egypt), with a total area of about 345,000 square miles, and a population vaguely estimated (1878, 1882) at from 1,000,000 to 1,500,000.

Wild animals are rare except in the Táká forests, where the elephant, lion, panther, rhinoceros, giraffe, hyena, and wild boar are met with. The crocodile and hippopotamus infest all the streams; many species of large and small snakes occur, but few are poisonous; the stork, wild goose, partridge, ibis, are among the chief representatives of the local avifauna.

The population being almost exclusively agricultural and pastoral, the industries are unimportant, and limited mainly to coarse cottons and woolens, pottery, and household utensils made of the date-tree. The exports also are confined to senna, some grain, leeches, musk, and honey. But although the local traffic is small there is a very large transit trade, carried on chiefly by caravans between Central Africa and Egypt. In this way considerable quantities of ivory, gold dust, ostrich feathers, and slaves have from the remotest times been brought down from the interior through Nubia to the seaports on the Mediterranean and the Red Sea. Of late years the slave trade has been almost entirely suppressed.

NUGEENAH. See NAGINA.

NUGENT, ROBERT, who ultimately became Earl Nugent, was a native of Westmeath in Ireland, and a Roman Catholic, tersely described by Richard Glover as "a jovial and voluptuous Irishman who had left Popery for the Protestant religion, money, and widows." His change of religion took place at a very early period in life. A speaker of great liveliness joined to good sense—Horace Walpole said that he seemed now and then on the precipice of absurdity, but that he kept clear of it—his support of the ministry was so useful that he became, in 1767, Viscount Clare, and, in 1776, Earl Nugent, both Irish peerages. He died October 13, 1788.

NUISANCE, in English law, is either public or private. A public or common nuisance is defined as an act not warranted by law, or an omission to discharge a legal duty, which act or omission obstructs or causes inconvenience or damage to the public in the exercise of rights common to all citizens. A common nuisance is punishable as a misdemeanor at common law, where no special provision is made by statute. In modern times many of the old common-law nuisances have been the subject of legislation. In some cases the common law and statutory remedy appear to be concurrent. It is no defense for a master or employer that a nuisance is caused by the acts of his servants, if such acts are within the scope of their employment, even though such acts are done without his knowledge and contrary to his orders. Nor is it a defense that the nuisance has been in existence for a great length of time, for no lapse of time will legitimate a public nuisance. Examples of public nuisances are the obstruction of highways, bridges, and navigable rivers, the keeping of disorderly

houses and gaming-houses, and the carrying on of offensive trades.

A private nuisance is an act or omission which causes inconvenience or damage to a private person, and is left to be redressed by action. It is not easy to define what amount of infringement of the rights of property will give a right of action. There must be some sensible diminution of these rights affecting the value or convenience of the property. The real question in all the cases is the question of fact, whether the annoyance is such as materially to interfere with the ordinary comfort of human existence. A private nuisance, differing in this respect from a public nuisance, may be legalized by uninterrupted use for twenty years. It used to be thought that, if a man knew there was a nuisance and went and lived near it, he could not recover, because, it was said, it is he that goes to the nuisance and not the nuisance to him. But such is not the law now. In such a case the newcomer has his civil remedy if the nuisance has not existed for twenty years, and of course his remedy at criminal law irrespective of time if the nuisance be public. The American law on the subject is practically the same as the English law.

NUKHA, a town of Russia, in the Caucasian government of Elizabetopol (formerly of Baku), and previous to 1819 the capital of the khanate of Sheki, lies 173 miles east-southeast of Tiflis, at the foot of the main chain of the Caucasus. Population, 24,000.

NULLIFICATION ACTS is a term used with reference to certain acts adopted by the Legislature of South Carolina in 1830-32, by which it was sought to nullify various acts of Congress in relation to the tariff. The claim was made in several of the States, and notably in South Carolina, that "it is an unconstitutional exercise of power on the part of Congress to lay duties to protect domestic manufactures." The cotton-producing States sold their chief product in European markets and were averse to any legislative action which looked toward the building up of New England cotton factories. The advocates of STATES' RIGHTS (*q.v.*) carried their doctrine to the extreme of claiming the right for individual States to nullify the Federal revenue laws, whenever in the opinion of the State Legislatures Congress had transcended its power. Under these circumstances the nullification movement assumed the form almost of a secession from the Union, and forecasted the events of 1860-61.

Andrew Jackson was president of the United States when the State of South Carolina undertook its nullification proceedings, and he made short work of them. After the South Carolina Legislature had several times declared, each time in stronger language, what it would or could or might do if a tariff bill were passed, Congress repealed the act of 1828, and adopted a new scale to take effect March 3, 1833. President Jackson had already declared in emphatic terms that he would see to the execution of the laws, and the State Legislature had declared his statement to be an unauthorized interference with the affairs of South Carolina. Finally on November 24, 1832, a convention called by the Legislature adopted an ordinance "to nullify certain acts of the Congress of the United States, purporting to be laws laying duties and imposts on the importation of foreign commodities." It declared the tariff laws of 1828 and 1832 to be unconstitutional and void and the collections of duties unlawful, and finally declared that if any attempt should be made by the Federal Government to coerce the State, they would hold themselves absolved from all obligations to maintain their political connection with the Union and would organize a separate government. This document was sent out to other States as the declaration of South Carolina.

Fortunately the United States possessed in the person of Andrew Jackson a man who was not afraid to administer the laws which he had sworn to execute. He replied to the "brave words" of the so-called convention with a proclamation declaring the ordinance an act of nullification and secession, denying the right of any State to annul a law, and declaring his determination "to execute the laws, to preserve the Union by all constitutional means, to arrest, if possible, by moderate and firm measures, the necessity of a resort to force."

The South Carolina legislature protested, exhorted the people to ignore the president's proclamation, and, on December 20, 1832, passed an act to carry the ordinance into effect by providing judicial remedies in the State courts for the recovery of goods seized or held for dues under the act of Congress. On March 2, 1833, Congress amended the act of 1832 by a compromise act reducing certain duties, and followed it on the next day by a Force Act, empowering the president to use military force to secure the collection of duties. Twelve days later the convention came together again and repealed its ordinance of nullification, but three days later it adopted another ordinance declaring the Force Act null and void. But, as the original ordinance had been repealed and the duties were collected without trouble, General Jackson could afford to treat the last ebullition as mere *brutum fulmen*, and did so, although he is credited with an expressed desire to hang John C. Calhoun, the leader of the nullification movement.

NUMANTIA, a town in Hispania Tarraconensis, of great natural strength, is famous for the memorable siege by the Romans under Scipio Africanus the younger. The siege began in 134 B.C.; the city was defended with the utmost bravery and tenacity, but after enduring the last extreme of famine the Spaniards were forced to surrender at discretion in 133. The inhabitants were sold as slaves and the town leveled to the ground.

NUMA POMPILIUS, the second of the legendary kings of Rome, was a Sabine, a native of Cures; his father's name was Pompo and his wife was daughter of Tatius, the Sabine colleague of Romulus. His election, which was made by the Roman people and ratified by the senate, took place at the close of a year's interregnum, during which the sovereignty had been exercised by the members of the senate in rotation. His peaceful reign of forty-three years was marked by the creation of many of the most characteristic institutions of Rome; it was he who set up the worship of the god Terminus, appointed the festival of Fides, built the temple of Janus, reorganized the calendar, fixed days of business and days of cessation therefrom, instituted the flamens of Mars and Quirinus, the virgins of Vesta, the salii, the feliales, the pontifices; in a word, the city which had been founded by means of violence and arms he succeeded in founding anew upon principles of justice, law, and morality. He derived his inspiration from Egeria or Ægeria, his spouse, whom he used to meet unattended in the grove of the Camenæ, where a perennial spring gushed from a dark recess. He was above eighty when he died.

NUMBERS, BOOK OF. See PENTATEUCH.

NUMBERS, PARTITION OF. This subject, created by Euler, though relating essentially to positive integer numbers, is scarcely regarded as a part of the Theory of Numbers. We consider in it a number as made up by the *addition* of other numbers.

NUMBERS, THEORY OF. The Theory of Numbers, or higher arithmetic, otherwise arithmology, is a subject which, originating with Euclid, has in modern times, in the hands of Legendre, Gauss, Lejeune-Dirichlet, Kummer, Kronecker, and others, been developed

into a most extensive and interesting branch of mathematics. We distinguish between the ordinary (or say the simplex) theory and the various complex theories.

NUMENIUS, one of the so-called Neo-Pythagoreans, and a forerunner of the Neo-Platonists, was a native of Apamea in Syria, and flourished during the latter half of the second Christian century. He was a somewhat voluminous writer on philosophy and philosophical biography, but all that is known of his opinions is found in passing references by Clement of Alexandria, Origen, Eusebius, and one or two of the Neo-Platonists.

NUMERALS. The use of visible signs to represent numbers and aid reckoning is not only older than writing but older than the development of numerical language on the denary system; we count by tens because our ancestors counted on their fingers and named numbers accordingly. So used, the fingers are really numerals, that is, visible numerical signs; and in antiquity the practice of counting by these natural signs prevailed in all classes of society.

The fingers serve to express numbers, but to make a permanent note of numbers some kind of mark or tally is needed. Thus the Romans kept count of years by yearly driving a nail into the temple of Minerva. The nail in this case is a sort of hieroglyphic, and in all systems of hieroglyphics signs for numbers naturally occur. A single stroke is the obvious representation of unity; higher numbers are indicated by groups of strokes. But when the strokes become many they are confusing, and so a new sign must be introduced, perhaps for 5, at any rate for 10, 100, 1,000, and so forth. Intermediate numbers are expressed by the addition of symbols, as in the Roman system ccxxxvi=236. Alphabetic writing did not do away with the use of numerical symbols, which were more perspicuous and compendious than words written at length. But the letters of the alphabet themselves came to be used as numerals. One way of doing this was to use the initial letter of the name of a number as its sign. This was the old Greek notation, said to go back to the time of Solon, and usually named after the grammarian Herodian, who described it about 200 A.D.

The most familiar case of the use of letters as numerals is the Roman system. Here C is the initial of centum and M of mille; but instead of these signs we find older forms, consisting of a circle divided vertically for 1,000 and horizontally, or in the cognate Etruscan system divided into quadrants for 100. From the sign for 1,000 comes D, the half of the symbol for half the number; and the older forms of L suggest that this also was once half of the hundred symbol. So V (Etruscan Λ) is half of X, which itself is not a true Roman letter. When high numbers had to be expressed systems such as we have described became very cumbersome, and in alphabetic systems it became inevitable to introduce a principle of periodicity, by which, for example, the signs for 1, 2, 3, etc., might be used with a difference to express the same number of thousands. The sexagesimal system, long specially associated with astronomy, has left a trace in our division of the hour and of the circle, but as language goes by powers of 10 it is practically very inconvenient for most purposes of reckoning. The Greek mathematicians used a sort of decimal system; thus Archimedes was able to solve his problem of stating a number greater than that of the grains of sand which would fill the sphere of the fixed stars by dividing numbers into octades, the unit of the second octade being 10^8 and of the third 10^{16} . So, too, Apollonius of Perga teaches multiplication by regarding 7 as the *pythmen* of 70, 700, and so forth. One must then find successively the product of the several pythmens of the multiplier and the multiplicand, noticing in

each case what are tens, what hundreds, and so on, and adding the results. The want of a sign for zero made it impossible mechanically to distinguish the tens, hundreds, etc., as we now do.

Very early, however, a mechanical contrivance, the abacus, had been introduced for keeping numbers of different denominations apart. This was a table with compartments or columns for counters, each column representing a different value to be given to a counter placed on it. This might be used either for concrete arithmetic—say with columns for pence, shillings, and pounds; or for abstract reckoning—say with the Babylonian sexagesimal system. An old Greek abacus found at Salamis has columns which, taken from right to left, give a counter the value of a 1, 10, 100, 1,000 drachms, and finally of 1 talent (6,000 drachms) respectively. An abacus on the decimal system might be ruled on paper or on a board strewn with fine sand, and was then a first step to the decimal system. Two important steps, however, were still lacking: the first was to use instead of counters distinctive marks (ciphers) for the digits from one to nine; the second and more important was to get a sign for zero, so that the columns might be dispensed with, and the denomination of each cipher seen at once by counting the number of digits following it. These two steps taken, we have at once the modern so-called Arabic numerals and the possibility of modern arithmetic; but the invention of the ciphers and zero came but slowly, and their history is a most obscure problem.

What is quite certain is that our present decimal system, in its complete form, with the zero which enables us to do without the ruled columns of the abacus, is of Indian origin. From the Indians it passed to the Arabians, probably along with the astronomical tables brought to Bagdad by an Indian ambassador in 773 A.D. At all events the system was explained in Arabic in the early part of the ninth century by the famous Abú Ja'far Mohammed al-Káhrizmí, and from that time continued to spread, though at first slowly, through the Arabian world.

In Europe the complete system with the zero was derived from the Arabs in the twelfth century, and the arithmetic based on this system was known by the name of *algorithmus*, *algorithm*. This barbarous word is nothing more than a transcription of Al-Khárizmí, as was conjectured by Reinaud, and has become plain since the publication of a unique Cambridge MS. containing a Latin translation—perhaps by Adelhard of Bath—of the lost arithmetical treatise of the Arabian mathematician. The arithmetical methods of Khárizmí were simplified by later Eastern writers, and these simpler methods were introduced to Europe by Leonardo of Pisa in the West and Maximus Planudes in the East. The term zero appears to come from the Arabic *sifr* through the form *zephyro* used by Leonardo.

NUMÉRIANUS, M. AURELIUS, Roman emperor, accompanied his father, the emperor Carus, on the Persian expedition beyond the Tigris, and along with his absent brother, Carinus, was proclaimed emperor on the death of the former (December, 283). Having resolved to abandon the campaign, he was returning toward Europe when he mysteriously died before Chalcedon was reached, eight months afterward.

NUMIDIA was the name given to a large tract of country in the north of Africa, extending along the Mediterranean sea from the confines of Mauretania to those of the Roman province of Africa. The term was, however, employed in very different senses, and within very different limits, at different periods of time. When Carthage was at the height of its power, and the Romans first came into contact with the nations of north-

ern Africa, the name of Numidia was applied to the whole country from the river Mulucha (now called the Mulúya), about 100 miles west of Oran, to the frontier of the Carthaginian territory, which nearly coincided with the modern regency of Tunis. It is in this sense that the term is employed by Polybius, and all succeeding historians down to the close of the Roman republic. Numidia was not incorporated with the Roman empire until a later period.

The name of the Numidians appears to have been nothing more than a Latinized form of the Greek term *Nomades*, vaguely applied by them to the wandering tribes of northern Africa. It could never have had any ethnographical signification; and there can be no doubt that the people thus designated were merely a portion of the great Berber race, which extended in ancient times from the shores of the Atlantic to the confines of Egypt, and which still, under the name of Kabyles, forms a portion of the population of both Algeria and Tunis.

The chief towns of Numidia under the Romans were: Cirta, the capital, in the interior, subsequently called Constantina, which name it still retains; Rusicada, on the coast, serving as its port, on the site now occupied by Philippeville; and east of it the more important city of Hippo Regius (well known as the see of the celebrated Augustine), near the modern Bona. South of Cirta, in the interior, were Theveste (now Tebessa) and Lambæsa (now Lambessa), with extensive Roman remains. But there were not less than ten towns with the title of "*coloniæ*," and in the fifth century the *Notitia* enumerates no less than 123 episcopal sees.

NUMISMATICS. The science of numismatics treats of coins and medals. It acquaints us with the metals used in their compositions, their various inscriptions and devices, their mechanical execution and artistic merit. It tells us of the different denominations of coins, their relation to one another, and the laws by which they were regulated.

The earliest known coins were issued by the Greeks in the seventh century before the Christian era. By the fourth century the whole civilized world used money, each State generally having its proper coinage. This has continued to be the case to the present time; so that now there are few nations without a metal currency of their own, and of these but a small proportion are wholly unacquainted with the use of coins. The number of varieties of coins and medals of which specimens are preserved in collections may be estimated at not less than several hundred thousand; and future discoveries will probably greatly increase this sum. A series of monuments of such length and completeness affords, as might be expected, very important illustration to history and to kindred branches of knowledge. This is, indeed, the real value of numismatics, and the student will do well to keep it constantly before him.

Coins, although they confirm history, rarely correct it, and never very greatly. The earliest belong to a time and to nations as to which we are not otherwise wholly ignorant, and they do not afford us that precise information which would fill in any important details of the meager sketch of contemporary history. We gain from them scarcely any direct historical information, except that certain cities or princes issued money. When in later times the devices and inscriptions of the coins give more detailed information, history is far fuller and clearer, so that the numismatic evidence is rarely more than corroborative. There are, indeed, some remarkable exceptions to this rule, as in case of the Bactrian coins, which have supplied the outlines of a portion of history which was otherwise almost

wholly lost. The value of the corroborative evidence afforded by coins must not, however, be overlooked. It chiefly relates to chronology, although it also adds to our knowledge of the pedigrees of royal houses. But perhaps the most interesting manner in which coins and medals illustrate history is in their bearing contemporary, or nearly contemporary, portraits of the most famous kings and captains, from the time of the first successors of Alexander the Great to the present age, whereas pictures do not afford portraits in any number before the latter part of the Middle Ages; and works of sculpture, although occupying in this respect the same place as coins in the last-mentioned period and under the Roman empire, are neither so numerous nor so authentic. There is no more delightful companion in historical reading than a cabinet of coins and medals. The strength and energy of Alexander, the ferocity of Mithridates, the philosophic calmness of Antoninus, the obstinate ferocity of Nero, and the brutality of Caracalla, are as plain on the coins as in the pages of history. The numismatic portraits of the time following the founding of Constantinople have less individuality; but, after the revival of art, they recover that quality, and maintain it to our own day, although executed in very different styles from those of antiquity. From this last class we can form a series of portraits more complete and not less interesting than those of the ancient period.

While coins and medals thus illustrate the events of history, they have an equally direct bearing on the belief of the nations by which they were issued; and in this reference lies no small part of their value in connection with history. The mythology of the Greeks, not having been fixed in sacred writings, nor regulated by a dominant priesthood, but having grown out of the different beliefs of various tribes and isolated settlements, and having been allowed to form itself comparatively without check, can scarcely be learned from ancient books. Their writings give us but a partial or special view of it, and modern authors, in their attempts to systematize, have often but increased the confusion.

The Greek coins, whether of kings or cities, until the death of Alexander bear sacred subjects only. Afterward, on the regal coins, the king's head usually occupies the obverse and a sacred subject is placed on the reverse. The coins of Greek cities under the empire have usually an imperial portrait and a reverse type usually mythological. The whole class thus affords us invaluable evidence for the reconstruction of Greek mythology. We have nowhere else so complete a series of the different types under which the divinities were represented.

Coins are scarcely less valuable in relation to geography than to history. The position of towns on the sea or on rivers, the race of their inhabitants, and many similar particulars are positively fixed on numismatic evidence. The information that coins convey as to the details of the history of towns and countries has a necessary connection with geography, as has also their illustration of local forms of worship. The representations of natural productions on ancient money are of special importance, and afford assistance to the lexicographer. This is particularly the case with the Greek coins, on which these objects are frequently portrayed with great fidelity.

The art of sculpture, of which coin-engraving is the offspring, receives the greatest illustration from numismatics. Not only is the memory of lost statues preserved to us in the designs of ancient coins, but those of Greece afford admirable examples of that skill by which her sculptors attained their great renown. The excellence of the designs of very many Greek coins struck during the period of the best art is indeed so

great that, were it not for their smallness, they would form the finest series of art studies in the world. The Roman coins, though at no time to be compared to the purest Greek, yet represent worthily the Græco-Roman art of the empire. The mediæval Italian medals are scarcely less useful as records of the progress and characteristics of art, and, placed by the side of the Greek and Roman coins, complete the most remarkable comparative series of monuments illustrating the history of the great schools of art that can be brought together. Ancient coins throw as great light upon the architecture as upon the sculpture of the nations by which they were struck. Under the empire, the Roman coins issued at the city very frequently bear the representations of important edifices. The Greek imperial coins struck in the provinces present similar types, representing the most famous temples and other structures of their cities, of the form of some of which we should otherwise have been wholly ignorant.

After what has been said it is not necessary to do more than mention how greatly the study of coins tends to illustrate the contemporary literature of the nations which issued them. Not only the historians, but the philosophers and the poets, are constantly illustrated by the money of their times. This was perceived at the revival of letters; and during the last two centuries coins were very frequently engraved in the larger editions of the classics.

The science of numismatics is of comparatively recent origin. The ancients do not seem to have formed collections, although they appear to have occasionally preserved individual specimens for their beauty. Petrarch has the credit of having been the first collector; but it is probable that in his time ancient coins were already attracting no little notice. The importance of the study of all coins has since been by degrees more and more recognized, and at present no branch of the pursuit is left wholly unexplored.

Besides its bearing upon the history, the religion, the manners, and the arts of the nations which have used money, the science of numismatics has a special modern use in relation to art. Displaying the various styles of art prevalent in different ages, coins supply us with abundant means for promoting the advancement of art among ourselves. If the study of many schools be at all times of advantage, it is especially so when there is little originality in the world. Its least value is to point out the want of artistic merit and historical commemoration in modern coins, and to suggest that modern medals should be executed after some study of the rules which controlled the great works of former times.

A *coin* is a piece of metal of a fixed weight, stamped by authority of government, and employed as a circulating medium.

A *medal* is a piece, having no place in the currency, struck to commemorate some event or person. Medals are frequently comprised with coins in descriptions that apply to both equally; thus, in the subsequent definitions, by the term coins, coins and medals must generally be understood.

The coinage of a country is usually divided into the classes of gold, silver, and bronze (copper), for which the abbreviations *Al*, *AR*, and *Æ* are employed in catalogues.

Whatever representations or characters are borne by a coin constitute its *type*. The subject of each side is also called a type, and, when there is not only a device but an inscription, the latter may be excluded from the term. This last is the general use. No distinct rule has been laid down as to what makes a difference of type, but it may be considered to be an essential difference however slight.

A difference too small to constitute a new type makes a *variety*. A coin is a *duplicate* of another when it agrees with it in all particulars but those of exact size and weight. Strictly speaking, ancient coins are rarely, if ever, duplicates, except when struck from the same die. Of the two sides of a coin, that is called the *obverse* which bears the more important device or inscription. In early Greek coins it is the convex side; in Greek and Roman imperial it is the side bearing the head; in mediæval and modern, that bearing the royal effigy, or the king's name, or the name of the city; and in Oriental, that on which the inscription begins. The other side is called the *reverse*. The *field* of a coin is the space unoccupied by the principal devices or inscriptions. Any detached independent device or character is said to be in the field, except when it occupies the exergue.

No uniform system has as yet been applied to the arrangement of all coins. It is usual to separate them into the three great classes of ancient coins (comprising Greek and Roman), mediæval and modern, and Oriental coins. The details of these classes have been differently treated, both generally and specially. The arrangement of the Greek series has been first geographical, under countries and towns, and then chronological, for a further division; that of the Roman series, chronological, without reference to geography; that of the mediæval and modern, the same as the Greek; and that of the Oriental, like the Greek, but unsystematically—a treatment inadmissible except in the case of a single empire.

NUMMULITE. See FORAMINIFERA.

NUN. See MONACHISM.

NUNCIO, or NUNTIUS APOSTOLICUS. See LEGATE.

NUNEATON, a market-town of Warwickshire, England, is situated near the Leicestershire border, ninety-seven miles northwest of London and twenty-two east of Birmingham. The population of the urban sanitary district (area 6,021 acres) in 1881 was 8,465.

NUNEZ or NONIUS, PEDRO, Portuguese cosmographer, was born at Alcacer do Sal in 1492, and died at Coimbra, where he was professor of mathematics, in 1577.

NUNEZ CABEZA DE VACA, ALVARO, Spanish explorer, was the lieutenant of Pamfilo Narvaez in the expedition which sailed from Spain in 1527, when Narvaez was lost in the Gulf of Mexico. He was born about 1490 and died in 1564.

NUREMBERG (in German, *Nürnberg*), the second town of Bavaria in size and the first in commercial importance, is situated in the district of Middle Franconia, in a sandy but well-cultivated plain, ninety-five miles to the northwest of Munich. It is divided by the small river Pegnitz into two parts, called respectively the Lorenzerseite and the Sebaldenseite, after the two principal churches.

Formerly among the richest and most influential of the free imperial towns, Nuremberg is one of the few cities of Europe that have retained their mediæval aspect substantially unimpaired. It is still surrounded with its ancient feudal walls and moat, though of late several breaches have been made to meet the exigencies of modern traffic. Of the 365 towers which formerly strengthened the walls, nearly 100 are still *in situ*, and a few of the interesting old gateways have also been preserved. Most of the streets are narrow and crooked, and the majority of the houses have their gables turned toward the street. The general type of architecture is Gothic, but the rich details, which are lavished with especial freedom in the interior courts, are usually borrowed from the Renaissance. Most of the private dwellings date from the sixteenth century, and there are

almost none of earlier date than the fifteenth century. Altogether it is difficult to conceive of a more piquant contrast than that afforded by the two chief towns of Bavaria—Munich, stamped with the brand-new impress of the nineteenth century, and Nuremberg, presenting a faithful picture of a well-to-do town of 300 years ago.

A good survey of this interesting town may be obtained from the old burg or castle, picturesquely perched on the top of a rock on the north side of the town. It is supposed to have been founded by the emperor Conrad II. about the year 1024, and dates in its present form mainly from the reign of Frederick Barbarossa (c. 1158). The castle of Nuremberg was a favorite residence of the emperors of Germany, and the imperial regalia were kept here from 1424 to 1806.

Nuremberg contains numerous interesting churches, the finest of which are those of St. Lawrence, St. Sebald, and Our Lady, three Gothic edifices of the thirteenth-fifteenth centuries.

The charitable, educational, scientific, and artistic institutions of Nuremberg are on a scale worthy of its ancient dignity. The Germanic National Museum, established in an old Carthusian monastery, has one of the most important historical collections in Germany. It includes a picture gallery with works by Holbein, Dürer, Wohlgemuth, etc. The Bavarian Industrial Museum is also a very creditable institution. The municipal library contains about 800 manuscripts and 50,000 printed books, some of which are of great rarity.

Though not of so great relative importance as of yore, Nuremberg still occupies a high place among the industrial and commercial centers of Europe. The principal manufactures are lead pencils, colors, gold and silver wire, gold and silver foil, railway plant, tobacco, playing-cards, and lastly the "Dutch" toys and fancy articles in metal, carved wood, ivory, etc., which are collectively known as "Nuremberg" wares.

The population of Nuremberg at the height of its prosperity has been estimated at as high a figure as 150,000, but there seems good reason to believe that it did not exceed 40,000 to 50,000 souls. In 1818 it had sunk to 27,000, but since then it has steadily increased. At the census of 1880 the town contained 99,519 inhabitants, 76,886 of whom were Protestants, 19,143 Roman Catholics, and 3,032 Jews. It had risen to 103,255 at the beginning of 1883.

NURSIA. See SABINES.

NUT. The term nut is applied to that class of fruit which consists generally of a single kernel inclosed in a hard shell. Botanically speaking, nuts are one-celled fruits with hardened pericarps, more or less enveloped in a cupule or cup, formed by the aggregation of the bracts. In commerce, however, the term has a wider application and embraces many fruits having hard woody indehiscent shells or coverings without reference to their inclosed seeds or kernels, besides leguminous pods, and even tuberous roots. A great number of nuts enter into commerce for various purposes, principally as articles of food or sources of oil, and for several ornamental and useful purposes. For the most part the edible nuts are very rich in oil, with only a small percentage of the other carbohydrates, starch, sugar, etc., and they also contain a large proportion of nitrogenous constituents. Thus possessing rich nutrient principles in a highly concentrated form, nuts are by themselves rather difficult of digestion, and the liability of many of them to become rancid is also a source of danger and hindrance to their free use. Oleaginous nuts used for food are likewise employed more or less as sources of oil, but on the other hand there are many oil-nuts of commercial importance not embraced in the list of edible nuts.

NU1ATION. See **ASTRONOMY.**

NUTCRAKER, the name given by Edwards in 1758 to a bird which had hitherto borne no English appellation, though described in 1544 by Turner. The nest of the Nutcracker seems to be invariably built on the bough of a tree, some twenty feet from the ground, and is a comparatively large structure of sticks, lined with grass. The eggs are of a very pale bluish-green, sometimes nearly spotless, but usually more or less freckled with pale olive or ash-color. The chief food of the Nutcracker, though it at times searches for insects on the ground, appears to be the seeds of various conifers, which it extracts as it holds the cones in its foot, and it has been questioned whether the bird has the faculty of cracking nuts—properly so called—with its bill, though that can be used with much force and, at least in confinement, with no little ingenuity.

NUTHATCH, in older English **NUTHACK**, from its habit of hacking or chipping nuts, which it cleverly fixes, as though in a vise, in a chink or crevice of the bark of a tree, and then hammers them with the point of its bill till the shell is broken. Without being very plentiful anywhere, it is generally distributed in suitable localities throughout its range—those localities being such as afford it a sufficient supply of food, consisting during the greater part of the year of insects, which it diligently seeks on the boles and larger limbs of old trees; but in autumn and winter it feeds on nuts, beechmast, the stones of yew-berries, and hard seeds. It generally makes its nest in a hollow branch, plastering up the opening with clay, leaving only a circular hole just large enough to afford entrance and exit; and the interior contains a bed of dry leaves or the filmy flakes of the inner bark of a fir or cedar, on which the eggs are laid. In the Levant occurs another species, *S. syriaca*, with somewhat different habits, as it haunts rocks rather than trees, and four or five representatives of the European arboreal species have their respective ranges from Asia Minor to the Himalayas and Northern China. North America possesses nearly as many; but, curiously enough, the geographical difference of coloration is just the reverse of what it is in Europe—the species with a deep rufous breast, *S. canadensis*, being that which has the most northern range, while the white-bellied *S. carolinensis*, with its western form, *S. aculeata*, inhabits more southern latitudes.

NUTMEG. The spice known in commerce under this name is the kernel of the seed of *Myristica fragrans*, Houtt., a dioecious evergreen tree, about fifty to sixty feet high, found wild in the Banda Islands and a few of the neighboring islands, extending to New Guinea, but not to the Philippines. Nutmeg and mace are almost exclusively obtained from the Banda Islands, although the cultivation has been attended with varying success in Singapore, Penang, Bengal, Réunion, Brazil, French Guiana, and the West Indies. The trees yield fruit in eight years after sowing the seed, reach their prime in twenty-five years, and bear for sixty years or longer. Almost the whole surface of the Banda Islands is planted with nutmeg trees, which thrive under the shade of the lofty *Canarium commune*. In Bencoolen the tree bears all the year round, but the chief harvest takes place in the later months of the year, and a smaller one in April, May, and June. The ripe fruit is about two inches in diameter, of a rounded pear-shape, and when mature splits into two halves, exposing a crimson arillus surrounding a single seed. When the fruit is collected the pericarp is first removed; then the arillus is carefully stripped off and dried, in which state it forms the mace of commerce. The seed consists of a thin, hard testa or shell inclosing a kernel, which, when dried, is the nutmeg. To prepare the nutmegs for use,

the seed inclosing the kernel is dried at a gentle heat in a drying-house over a smoldering fire for about two months, the seeds being turned every second or third day. When thoroughly dried the shells are broken with a wooden mallet or flat board and the nutmegs picked out and sorted, the smaller and inferior ones being reserved for the expression of the fixed oil which they contain, and which forms the so-called oil of mace.

“Oil of mace,” or nutmeg butter, is a solid fatty substance of a reddish-brown color, obtained by grinding the refuse nutmegs to a fine powder, inclosing it in bags and steaming it over large caldrons for five or six hours, and then compressing it while still warm between powerful wedges, the brownish fluid which flows out being afterward allowed to solidify. Nutmegs yield about one-fourth of their weight of this substance. It is partly dissolved by cold alcohol, the remainder being soluble in ether. The latter portion, about 10 per cent. of the weight of the nutmegs, consists chiefly of *myristin*, which is a compound of *myristic acid*, with glycerine. Nutmeg butter yields on distillation with water a volatile oil to the extent of about 6 per cent., consisting almost entirely of a hydrocarbon. It is accompanied by a small quantity of an oxygenated oil, *myristicol*, isomeric with carvol, but differing from it in not forming a crystalline compound with hydrosulphuric acid. Mace contains a similar volatile oil, *macene*, which is said by Cloëz to differ from that of nutmegs in yielding a solid compound when treated with hydrochloric acid gas.

NUTRITION. By the term nutrition, employed in its widest sense, is understood the process, or rather the assemblage of processes, concerned in the maintenance and repair of the living body as a whole, or of its constituent parts or organs. The term has, however, usually been limited in systematic treatises on physiology to a study, mainly statistical, of the relations which exist between a living being and the medium which it inhabits, embracing a determination of the gains and losses of the organism under the different conditions to which it may be exposed. Such a statistical study has already been pursued in the article **DIETETICS**, and we shall therefore, in the present article, restricting our attention to the animal kingdom, consider nutrition in the more general sense above referred to, including—(1) a study of the function of digestion; (2) a sketch of the processes concerned in the absorption of matter into the blood; (3) an account of the chemical processes which have their seat in the tissues and organs of the body; (4) an account of the processes whereby redundant matters, or such as are the products of waste, are removed from the animal economy; (5) a reference to the transformations of energy which are associated with the exchange of the matters of the body; (6) a brief reference to the processes of growth, decay, and death.

There is no conception which we can form in reference to a living being, however rudimentary its structure, which is so general as the following:—A living animal, so long as it manifests those attributes which characterize it as living, is the seat of continual transformations of potential into kinetic energy.

Such transformations are connected with oxidation of organic matters which, primarily derived from the vegetable kingdom, have been *assimilated*, *i.e.*, have been converted into the substance of the animal, and are effected through the agency of oxygen gas introduced into the body in the process of respiration. The act of living is an act of combustion in which the animal body actually burns, and the energy at the disposal of the body, and which is employed in raising its temperature or effecting the movements which are essential to its continued life, is energy which was potential in the

organic constituents burned. The main products of the combustion of the body are carbonic acid and water, besides certain other less completely oxidized substances, which are the analogues of the sooty and tarry products of combustion in a furnace. Of these products some, as carbonic acid and a part of the water formed, are removed from the body almost as soon as they are formed, while others are thrown off at intervals.

It follows from what has been stated that the act of living necessarily implies not only transformation of energy but actual waste of the matter of the body, and that if an animal is continuously to manifest the phenomena of life it must be supplied with oxidizable organic matter to take the place of that which has been oxidized. Accordingly, animal life is impossible unless the creature, besides receiving continual supplies of oxygen gas, receives at intervals supplies of food. The food of an animal consists (1) of oxidizable organic matters which, although they may have been derived in part or wholly from some other animal body, have primarily been built up through the instrumentality of vegetable organisms—these organic matters belong to a few well-defined groups; (2) of mineral matters, including large quantities of water, which form an important part of the substance of the body, and the presence in and passage of which through the organism is essential to the physical processes which have their seat in it.

In brief, the animal body is the seat of processes of disintegration associated with the manifestation of kinetic energy, and of processes of integration in which oxidizable matters take the place of the oxidized constituents. If life is to continue, in a sense, indefinitely, it is essential that the processes of integration and disintegration should balance, *i.e.*, that the receipts of the body in assimilable oxidizable matter should balance the expenditure of the body in both matter and energy. There are, it will be observed, very close analogies between an animal and such a mechanism as a steam-engine, the energy at the disposal of both being primarily derived from the oxidation of combustible matters. Some of the most salient points of difference must, however, not be lost sight of. (1) The waste of the essential parts of such a machine as a steam-engine is insignificant, and bears no definite relation to the work done. The kinetic energy of the machine is primarily due to oxidation processes taking place in the furnace, and in no respect to changes in the substance of the machine. The animal, on the other hand, wastes continuously in all its parts and organs, and much of its energy is derived immediately from material which has become part and parcel of the various mechanisms. (2) Any substance capable of being rapidly oxidized (burned), and thus of generating heat, may be used as fuel for a steam-engine, provided its combustion admits of being conducted with safety in its furnace, while the substances which can form the food of animals belong in a limited number of groups, which include but a comparatively small number of bodies. The constituents of food have not only to supply energy to the body, but they must further be capable of prior conversion into the very substance of the animal body, into its very "flesh and blood."

Moreover, the constituents of food must be free from all traces of the peculiar substances which we term "poison," and which by their presence have the power of impairing and arresting the action of various organs of the body.

Hunger and Thirst.—These terms are used to express peculiar sensations which are produced by and give expression to general wants of the system, satisfied respectively by the ingestion of organic solids contain-

ing substances capable of acting as food, and by water or liquids and solids containing water. Hunger is a peculiarly indefinite sensation of craving or want which is referred to the stomach, but with which is often combined, always indeed in its most pronounced stages, a general feeling of weakness or faintness. The earliest stages are unattended with suffering, and, leading the animal to wish and seek for food, are characterized as "appetite for food." Hunger is normally appeased by the introduction of solid or semi-solid nutriment into the stomach, and it is probable that the almost immediate alleviation of the sensation under these circumstances is in part due to a local influence, perhaps connected with a free secretion of gastric juice. Essentially, however, the sensation of hunger is a mere local expression of a general want, and this local expression ceases when the want is satisfied, even though only liquid and no solid food is introduced into the stomach, or even though no food be introduced into the stomach, the needs of the economy being satisfied by the introduction of food through other channels, as, for example, when food which admits of being readily absorbed is injected into the large intestine.

Thirst is a peculiar sensation of dryness and heat localized in the tongue and throat. Although thirst may be artificially produced by drying, as by the passage of a current of air over the mucous membrane of the above parts, normally it depends upon an impoverishment of the system in water. And, when this impoverishment ceases, in whichever way this be effected, the sensation likewise ceases. The injection of water into the blood, the stomach, or the large intestine appeases thirst, though no fluid is brought in contact with the part to which the sensation is referred.

The sensations the causes of which we have briefly attempted to trace lead us, or when urgent compel us, to take food and drink into the mouth. Once in the mouth, the entrance to the alimentary canal, the food begins to undergo a series of processes, the object of which is to extract from it as much as possible of its nutritive constituents. It cannot be sufficiently emphasized that food in the alimentary canal is, strictly speaking, outside the confines of the body; as much so as the fly grasped in the leaves of the insectivorous *Dionea* is outside of the plant itself. The mechanical and chemical processes to which the food is subjected in the stomach and intestines are processes which have their seat and conditions outside the body which it is destined to nourish, though unquestionably the body is no passive agent, and innumerable glands have to come into action in order to supply the chemical agents which shall dissolve and render assimilable those constituents of the food which are capable of being absorbed into the organism, and of forming part and parcel of its substance.

The processes to which the food is subjected, though manifold, are divisible into two great groups: (1) the food must be subjected to the action of certain juices which dissolve insoluble alimentary matters, and modify these no less than certain of the soluble alimentary substances; and (2) it must be mechanically mixed with those juices, and propelled more or less slowly from beginning to end of the alimentary canal. In accordance with this twofold function the alimentary canal is divisible into two distinct but intercalated anatomical tubes—(1) an internal tube of mucous membrane, and (2), investing this closely, an external muscular tube.

When food is introduced into the mouth it is submitted to the operation of mastication. After the food has been reduced to a proper consistency by the combined influence of the mechanical movements of the jaws, tongue, and cheeks, and the action of the saliva,

It is rolled into a mass or bolus ready for swallowing. By the approximation of the tongue to the palate the angle is lessened and the bolus is, in consequence, driven backward. This constitutes the first stage in the act of swallowing, and is a voluntary act. At the end of the first stage the morsel of food has passed beyond the level of the anterior pillars of the fauces. The acts of the second stage are very complicated, and probably are entirely involuntary. Once in the gullet, the mass of food is driven downward by the so-called "peristaltic" movements of the tube—the circular fibers contract one after another from the above downward, lessening the caliber of the tube in successive stages, while the longitudinal fibers seem to have the function of drawing the tube over the bolus as a stocking is drawn over the foot. At the entrance of the stomach the food meets the barrier opposed by the contracted cardiac orifice; the contraction must be overcome before the food can gain admittance. The relaxation is certainly an active process under the control of medulla oblongata through the vagus nerve, since section of the vagi causes a block to the progress of food from the œsophagus into the stomach.

In the stomach the food is detained for a period which varies very greatly with its digestibility, but which in the human subject is not often longer than four or five hours. It is subjected to a rubbing and rolling action of the stomach-walls and a modified peristalsis, which causes the food to move slowly from the cardiac orifice along the greater curvature to the pylorus, whence it returns along the small curvature to the cardiac end again. The gastric movements are slight at first, but gradually increase in vigor. The pylorus is tightly closed at the beginning of a meal, but becomes more and more relaxed as digestion proceeds, so that, while at first only the finer parts of the gastric contents can pass, afterward the coarser parts and even solid lumps of imperfectly-digested aliments are permitted to escape into the duodenum. We possess little accurate knowledge as to the nervous mechanism of the stomach. All that we know is (1) that movements of an excised stomach are induced with great difficulty, (2) that stimulation of the vagus will often cause movements of the stomach, and (3) that section of the vagi impedes the passage of food out of the stomach. The movements of the stomach have been said to cease altogether during sleep.

When the gastric contents, to which the term chyme is often applied, pass through the pylorus into the duodenum, they begin to move onward by the pure peristaltic action of the small intestines. The powerful annular fibers contract one after another, driving the food onward, as water may be squeezed along an india-rubber tube by the compression of the hand. The longitudinal fibers contract in such a manner that the intestine is drawn over the advancing mass. The movements always occur (in health at least) in a direction from the stomach to the ileo-cæcal valve; here they stop and never pass as a continuous wave to the large intestine.

After passing through the ileo-cæcal valve the intestinal contents, which have been very greatly diminished in amount owing to the process of absorption that has gone on, quickly assume the characteristic appearance of fæces. The undigested and insoluble parts of the food, mixed with mucus, with epithelial débris, and with some substances derived from the secretions of the alimentary canal, notably with some biliary products, must be cast out; this is effected by the act of defæcation. The anus is normally kept firmly closed by the contraction of two sphincter muscles—the external, which is one of the skeletal muscles, and the internal, which is formed by a

special development of the lowest rings of the circular layer of muscles of the intestine. In the act of defæcation these sphincters are relaxed, while the contraction of the rectum forces its contents downward. The levatores ani are brought into play by the will and exert an action similar to that previously referred to as performed by the longitudinal fibers of the intestine. Of special influence in aiding the expulsion of the contents of the bowel is the contraction of the abdominal muscles which follows a preliminary fixation of the diaphragm by a deep inspiration.

The act of defæcation is essentially a reflex act. The center which presides over the sphincters of the anus lies in the lumbar portion of the spinal cord. This center is under the control of the brain, under the influence of which its activity is either increased or inhibited.

Vomiting, or the ejection of the contents of the stomach through the mouth, is an act of considerable complexity; (1) the cardiac orifice of the stomach is relaxed or, to be accurate, thrown open by the operation of some reflex nervous mechanism with which the vagus is connected; (2) contraction of the muscular coat of the stomach occurs; (3) the abdominal walls are powerfully compressed, and the diaphragm is at the same time strongly fixed by closure of the glottis. As concurrent phenomena in ordinary vomiting may be mentioned the sense of nausea and the free flow of saliva which occurs during and indeed before the act.

Vomiting may, within certain limits, be inhibited by taking a series of deep and rapid inspirations at a time when the sense of nausea is becoming unbearable.

True vomiting seems to be impossible without the aid of the abdominal muscles, as, for example, when the abdomen is laid open. In such conditions emetics cause active opening of the cardiac orifice and movements of the stomach-walls, but not the full and free expulsion of the contents. Vomiting is usually a reflex act, the center for which lies in the medulla oblongata, near the center for respiration, though it is reasonable to suppose that it may occur not only as a reflex act but as a result of direct stimulation of the center or centers associated with it.

We have described the movements of the alimentary tube by which the food is triturated and agitated, and finally propelled from mouth to anus. One object of these movements is to mix together the food and certain solvent juices which are poured upon the food at various points.

Besides the proteolytic and amylolytic ferments, there occur in the alimentary canal a *curdling* ferment, an *inverting* ferment, and perhaps a *fat-decomposing* ferment.

All enzymes exert a more energetic action at a moderately high than at a low temperature, though the influence of a rise in temperature is more marked in some cases than in others. The reaction of the medium in which they are placed influences remarkably the activity of certain enzymes; thus pepsin, the proteolytic ferment of the stomach, is inactive in neutral or alkaline solutions, the presence of a free acid being essential to its activity, while trypsin, the proteolytic ferment of the pancreas, acts with feebleness in solutions which are neutral or faintly acid, since it needs for the full exercise of its powers a decidedly alkaline medium. The enzymes appear to possess the power of rapidly inducing, at the temperature of the animal body, in bodies subjected to them, similar chemical operations to those which can be brought about with great slowness by prolonged heating with dilute mineral acids, or by the prolonged action of boiling water or superheated steam. These operations are of the nature of *hydro-*

lytic decomposition, that is to say, such as are connected with the union of the elements of water with the decomposing body.

There are no secreting glands in the body which have been subjected to so elaborate a study as the salivary glands, whether we consider their structure or the circumstances which influence or accompany the act of secretion. The saliva is secreted by several glands of which the ducts pour their secretion into the cavity of the mouth, where it is mingled and constitutes the "mixed saliva." The chief of these glands are the parotid, the submaxillary, and the sublingual glands, though their secretion is mixed with that of small glands (mucous and serous) scattered through the mucous membrane of the mouth and tongue, which are included under the term "buccal" glands.

The salivary glands all belong to the group of acinous or compound racemose glands.

Each salivary gland is supplied by at least three classes of fibers, viz., secretory, vaso-constrictor, and vaso-dilator fibers, of which the first and third are conveyed to the glands in branches of cerebral nerves; these are, the chorda tympani for the submaxillary and sublingual, and the auriculo-temporal (which, however, derives them through communications with the otic ganglion from the glosso-pharyngeal nerve) for the parotid. The second class, the vaso-constrictor or vaso-motor fibers, run in sympathetic trunks. When, therefore, one of the cranial branches supplying a gland is stimulated there occur two acts, viz., secretion and simultaneous dilatation of blood-vessels; that these two acts are not absolutely interdependent is proved by the fact that certain drugs paralyze the one set of fibers, but leave the other intact. When, on the other hand, the sympathetic filaments supplying the gland are stimulated, the blood-vessels of the gland contract, and there is produced a small quantity of saliva differing in physical characteristics and chemical composition from that obtained under the circumstances first referred to. According to Heidenhain, however, in each of the two kinds of nerves supplying a salivary gland there exist, besides the vascular nerve-fibers, secretory and trophic fibers, though the number of one or the other of these classes may be insignificant—the secretory predominating in the cranial nerve branches, the trophic in the sympathetic. Stimulation of secretory fibers leads, according to Heidenhain, to an increased flow of water, stimulation of the trophic to an increased secretion of specific substances and to an increased production of protoplasm.

When a salivary gland passes from a state of rest into that of activity it is at once the seat of an increased blood flow, which is associated with the dilatation of the blood-vessels of the organ. Under these circumstances, the blood leaving the gland presents a florid arterial color, instead of the venous color which characterizes the blood of the organ when at rest. This vascular dilatation is explained by the coming into action of the before-mentioned vaso-dilator fibers; it is independent of the act of secretion.

The "mucous glands of the stomach," so called from their having been formerly erroneously supposed to be engaged in the secretion of mucus only, are situated chiefly at the pyloric end of the stomach. The "peptic glands" owe their name to the view that they alone secrete the digestive gastric juice, and are found in most animals in the mucous membrane of other parts of the stomach than the pylorus.

During active digestion the cubical cells of both pyloric glands and glands of the fundus become swollen and granular; after a period of rest they return to their original size and assume a comparatively clear appear-

ance. The ovoid cells also swell during digestion, but in other respects remain unchanged.

When the stomach is inactive, *i.e.*, in the fasting condition, its mucous membrane is pale and the organ contains no fluid; the mucous membrane in the pyloric region presents an alkaline reaction. When, however, food enters the stomach, or the mucous membrane is subjected to mechanical stimulation, an acid juice, the so-called gastric juice, is poured out, the act of secretion being accompanied by a reddening of the mucous membrane.

No accurate estimate can be formed of the amount of gastric juice secreted during twenty-four hours. It has been calculated to be between twenty and thirty pints. Secretion of gastric juice may occur after all the nerves going to the stomach have been divided, though it is for a time arrested after division of the pneumogastric nerves. It is probable that the process of gastric digestion is essentially under the control of an intrinsic nervous mechanism situated in the mucous membrane, though this is normally influenced by the higher nerve centers.

The secretion of the liver, the bile, is being continually formed, though not always at the same rate. In animals possessed of gall-bladder it is stored in the intervals of digestion in this reservoir. When food is taken into the stomach the bile begins to be secreted in larger quantities, the maximum being reached about six hours after the meal. As the so-called acid "chyme," to be afterward referred to, passes the opening of the bile-duct in the duodenum, it is probable that a stream of bile is poured upon it by the reflex of contraction of the gall-bladder. During the time when bile is being secreted much heat is evolved in the liver. The bile, as will be shown in the sequel, should be looked upon as a liquid containing only certain, for the most part useless, by-products resulting from great chemical operations going on in the liver. Little is known as yet of the exact changes which occur in the liver-cells during activity, nor of the manner in which the nervous system influences the secretion of bile.

The pancreas possesses a structure which presents great resemblance to that of serous salivary glands, and its alkaline secretion was until lately looked upon as closely resembling the saliva.

The cells of the pancreas elaborate a substance which is the antecedent of the proteolytic ferment, and which yields it when it passes into the pancreatic ducts; it is customary to speak of this body as *zymogen* or ferment-former, because it gives rise to one of the chief enzymes or ferments of the juice. The secretion of pancreatic fluid is slight except during digestion. After the taking of a full meal the secretion is suddenly exalted, reaching its maximum two or three hours afterward. The secretion then diminishes until a period which extends from the fifth to the seventh hour, when a rise occurs, which lasts to between the ninth and eleventh hours after food. The secretion then gradually sinks, until it absolutely ceases. Stimulation of the gastric mucous membrane starts the secretion of pancreatic juice; it is arrested during nausea and vomiting, as also when the central end of the divided pneumogastric is stimulated.

The mixed saliva of man is, when perfectly fresh, a clear, transparent, viscid liquid, which, on microscopic examination, is found to contain cells of squamous epithelium derived from the mouth, besides certain globular cells derived from the salivary glands and called "salivary corpuscles." Its reaction is alkaline; it has a specific gravity of about 1.003, and contains about five or six parts per thousand of solid matters.

The changes which are brought about by the action of the salivary ferment on the starchy constituent of food

are hastened by a temperature near that of the mammalian body. Boiling destroys the diastatic power, as also does the presence of strong acids or alkalies. A very feeble acid reaction does not absolutely stop the characteristic action. While the saliva of man and some few animals possesses the remarkable diastatic ferment just referred to, this is absent from the saliva of the majority of animals, so that we are forced to conclude that the saliva is an alimentary juice which subserves mechanical rather than essential chemical functions.

Gastric juice is a thin colorless or straw-colored liquid of strongly acid reaction, and of a mawkish taste. Its specific gravity varies between 1.001 and 1.010, and it contains from $\frac{1}{2}$ to 1 per cent. of solid matters.

The gastric juice contains free hydrochloric acid, certain mineral matters, and a ferment or enzyme called pepsin. The pepsin, which has never been separated in a pure condition, is soluble in water, weak spirit and glycerine, and confers upon all these solvents its characteristic property, viz., that of dissolving, in the presence of a dilute free acid, and at a suitable temperature, insoluble proteids, and of converting these into soluble and diffusible modifications termed peptones. Peptones differ from other albuminous or proteid bodies in their greater diffusibility, as well as in their much higher solubility in pure water. They are not coagulated by heat or by nitric acid, and are not thrown down by many mineral salts which precipitate other soluble proteids.

In addition to pepsin the gastric juice contains an entirely independent ferment which is called the "curdling ferment" or the "rennet ferment," because of its power of rapidly inducing at the temperature of the body the coagulation of the casein of milk, which it converts into cheese. Unlike pepsin, this ferment will act in solutions which contain no trace of free acid.

Bile is a bitter liquid of golden-red color in man and carnivorous animals, but green in herbivorous animals. It is commonly viscid owing to admixture with mucus derived from the walls of the gall-bladder and hepatic ducts. Its reaction is neutral or faintly alkaline. It contains about 14 per cent. of solid constituents.

The amount of bile secreted by man has been estimated at from about 136 grains to about 309 grains per kilogram (2.20 pounds) of body-weight; but in certain cases, through abnormal circumstances, the total amount of bile secreted in twenty-four hours has been found to be less than this, viz., to vary between about sixteen and twenty-one ounces.

The action of the bile in digestion, it must be admitted, seems trifling and out of proportion to the size of the gland and the amount of the secretion. It is a weak solvent for fats; it has the power of emulsifying fats, especially, perhaps, when added to the pancreatic juice; and it may help the passage of fat through animal membranes. At least it is certain that, when filter-paper is wetted with bile, oils filter through it more readily than when it is wetted with water. The most important use of the bile is, however, as an adjuvant to pancreatic digestion. The pancreatic juice contains a ferment which is either a proteid body or inseparably connected with a proteid body. Strangely, though this ferment possesses the power of dissolving proteids under suitable circumstances, in the presence of pepsin and any free acid it is itself destroyed. It would then be acted upon by the pepsin passing into the duodenum from the stomach if the conditions were favorable. To prevent this untoward accident the alkaline bile is poured over the acid contents of the stomach as they pass the duodenum; these are neutralized, and a precipitate is thrown down which mechanically entangles the pepsin that may be in the mixture. Although the definable uses of the

bile are small, the part which it plays in the economy is of essential importance. Animals whose bile is allowed to escape externally soon grow lean and ill-conditioned. The fat which should be absorbed in the alimentary canal remains in part in the fæces, which acquire a peculiar putrescent odor. If we except the gastric juice, the chemical action exerted by the pancreatic juice is the most potent and useful of any of the digestive secretions.

When freshly secreted and perfectly normal, the pancreatic juice is a clear viscid liquid of strongly alkaline reaction and highly coagulable by heat. Its solid constituents may reach the proportion of 10 per cent.

The amylolytic or diastatic ferment of the pancreatic juice resembles that of the saliva in its action. While the saliva of most animals contains no such ferment, the pancreatic juice of all animals is very rich in diastatic ferment, so that the action of the pancreatic juice on starch is much greater than that of saliva.

Intestinal juice, which is also called not infrequently by its Latin name *succus entericus*, is a thin, yellowish, alkaline, albuminous liquid of specific gravity 1.01, concerning which we possess very little information. It has been said to act upon fibrin alone of the albuminous bodies; it not only contains a small quantity of diastatic ferment but probably also a so-called inverting ferment, possessing the power of converting cane-sugar into grape-sugar.

The food which is introduced into the mouth is an exceedingly complex substance. Leaving out of account those substances which are insoluble and incapable of absorption, and which are also not amenable to the influences of the digestive juices, we may classify the true food-stuffs as follows:—

(1) *Albuminous matters*, including (a) the true *proteids*, such as albumen of egg, casein of milk, myosin of muscle, fibrin of blood, etc., and (b) the *albuminoid bodies*, such as gelatin from tendons and bones, chondrin from cartilages, and elastin from various elastic structures; (2) *hydrocarbons* or *fats*, of which those chiefly used for food are stearin, olein, and palmitin; (3) *carbohydrates*; (4) the various *inorganic salts*; (5) *water*. The third group includes the *amyloids* or starch-like bodies; the *saccharoses* like cane-sugar, the *glucoses* like the grape-sugar and fruit-sugar found in honey and in ripe fruits, the sugar of milk, etc. In addition to these may be mentioned allied bodies, cellulose, pectin, arabin, mucilage, etc., which in some animals, or in some conditions, are certainly digestible. In a subdivision of the same group we may place the various vegetable acids, lactic, acetic, citric, malic, etc., which are essentially foods.

It may be premised that the fate which befalls a given example of ingested food does not depend solely upon the theoretical power of the digestive juices to act upon it. Thus digestible food may be imperfectly digested owing to being passed into the stomach in lumps and masses, which the juices cannot permeate and the stomach cannot crush; or starch may be so incorporated and encapsuled with fat that the saliva and even the pancreatic juice may fail to reach it; or digestion from one cause or another may be so prolonged that fermentative changes, to which most samples of food are inevitably liable from containing organized ferments or "germs," may have time to begin and to alter materially the sequence of events. Hence we shall feel no surprise that much food escapes altogether the action of digestion. The most perfect and economical feeding is that in which the least quantity of food is passed through the alimentary canal unchanged. When, however, the just quantity is taken, and the digestive organs are sound, the following is the order of the changes which occur.

Food placed in the mouth at once excites the flow of mixed saliva and mucus. Solid food is broken up, rubbed together with the juices of the mouth and entangled air-bubbles, and rolled into a slimy bolus. Soluble constituents of it thus have an opportunity of becoming dissolved at once; sugar, dextrin, vegetable acids, and many inorganic salts would, in part at least, pass into solution in the mixed saliva. The process of mastication, besides triturating the food and mixing it with the alkaline saliva, permits it to become raised nearly to the body-temperature, in which condition the dextrin and the starches readily fall a prey to the ptyalin, and begin to be converted into dextrins and maltose. This change is very rapidly effected—it begins instantly if the starch is already boiled; so that, unless the food is “bolted,” a considerable quantity of soluble dextrin and sugar is formed before the bolus is swallowed. The act of deglutition passes the softened bolus into the stomach, where already a certain quantity of acid gastric juice is ready to receive it. The presence of food in the stomach is a greater stimulus to the gastric flow than its presence in the mouth; the juice is more rapidly secreted, but still it is comparatively poor in pepsin and still more so in free acid; but after a time, as more food is added, and as the first-coming food begins to be dissolved and absorbed, the proportion of pepsin is increased. The movements of the stomach mix intimately the acid juice and the alkaline food; the first effect of this is a neutralization of the mass, but, as the secretion of juice goes on for some time after the last portion of an ordinary meal has been swallowed, the mass becomes more and more acid. The amylolytic action of the swallowed saliva is gradually checked, and the still unchanged starch remains unchanged so long as it lingers in the stomach.

The presence of food in the stomach is of itself a stimulus to the secretion of bile and pancreatic fluid; by the time, therefore, that the chyme passes into the duodenum, a considerable quantity of the fresh juices is prepared for it. Not only so; the contact of the acid chyme with the duodenal membrane at once brings on a reflex contraction of the ducts and gall-bladder of the liver, by which a sharp stream of alkaline fluid is at once poured out, wherewith the chyme is drenched. So far as the mixture is made perfect and the point of neutralization is reached, a precipitate of parapeptones and peptones is formed, carrying down with it the active pepsin. But the acidity of the chyme is not at once overcome; not until the middle of the small intestine is reached does the acid reaction entirely disappear; and we may therefore assume that a kind of exotic gastric digestion may go on in the parts of chyme which still remain acid. But whenever the reaction ceases to be strongly acid the pancreatic juice takes up the work of digestion. Proteids are changed into soluble peptones, and the conversion of starch into dextrin and maltose begins again with redoubled vigor. Fats are seized upon, resolved into glycerin and their fatty acids, and emulsified both by bile and by pancreatic fluid. The resulting fatty acids combine with the alkalies of the mass to form soaps, which in turn aid the process of emulsification. The chyme, which, from being gray, became of a golden-orange color when saturated with bile, acquires a decidedly cream-like appearance from the emulsion that is formed.

As the remnant of food passes down the intestine, changes allied to putrefaction invariably occur. Lactic acid is always to be detected in the small intestine, and the amount of it increases as the ileo-cæcal valve is approached. Possibly the butyric acid fermentation likewise occurs as a constant, if not an essential, phenomenon of intestinal digestion. At least the gases of

the small intestine always contain a small amount of hydrogen; but if we are to gauge the butyric acid fermentation by the amount of hydrogen detected, we must assume it to be of very small proportions. We are so ignorant of the nature of the enteric or intestinal juice that we need not here speculate as to the changes in the remnant of food which the addition of it may bring about. Let it suffice to say that the intestinal contents pass through the ileo-cæcal valve with none of the odor and little of the appearance of fæcal matter. While in the large intestine they become reduced in bulk, and approach a solid consistency by the abstraction of water from them. Their reaction becomes distinctly acid once more; but now, from inward processes of putrefaction and fermentation which were started already in the small intestine, putrefactive gases may arise, light carbureted hydrogen, carbonic acid, sulphureted hydrogen, nitrogen, and hydrogen. The fæces themselves are commonly acid; besides the indigestible parts of food, such as horny matter and cellulose (the denser sorts at least), and the undigested but digestible overplus of starch, proteid, etc., they contain derivatives from the bile which cause the characteristic color, and some final decomposition products of elements of food, such as indol.

The complex processes of digestion result in the conversion of insoluble and indiffusible food-stuffs into soluble and diffusible sugars and peptones. These, with the soluble saline matters, the finely-divided or emulsified fats and water, are (if we except the small quantity of soaps formed in the course of pancreatic digestion, and the small amount of soluble leucin and tyrosin evolved in the same process) the only contents of the alimentary canal capable of entering the organism from the outer world. They are not, indeed, the only soluble and absorbable bodies in the intestine; a large part of the digestive juices themselves are reabsorbed, and may possibly do duty over again in their respective secretions. But these are not foods. How, it may now be asked, do these soluble or finely-divided substances pass the confines of the body? From what has already been said about the organs of digestion it will be evident that, from the stomach downward, the alimentary cavity is separated from an infinite number of thin-walled vessels by a delicate layer of columnar epithelium and a filmy basement membrane. There seems at first sight to be no difficulty in understanding how water and dissolved and diffusible matters may pass these barriers with the greatest readiness by physical processes of diffusion which are so simply imitated in the laboratory. We know also that, in fact, solutions do with the greatest ease and rapidity pass through such a membrane as the conjunctiva, by the readiness with which the pupil may be dilated on putting a drop of atropinized fluid beneath the eyelid. But it is by no means clear that the process is so simple in the living intestine. A fresh specimen of epithelium scraped from the interior of the mouth of a pig may be bathed in a solution of coloring matter and yet admit no trace of the color into the substance of its cells so long as they remain alive. It is only when they cease to be living protoplasm that the physical processes of diffusion come into play and that the cell-substance takes up the color. Guided by this simple observation, we shall hesitate to assume, because we have water containing soluble sugars, salts, and peptones on one side of the epithelium of the alimentary tract, while on the other we have fluids differently constituted, that, therefore, we must needs have a process of transfusion tending to the passage of the dissolved substances from one side to the other. This “absorption” of matters, even simple saline solutions, at the surface of the intestine, may be, and most

probably is, a vital operation. Once through the epithelial layer the absorbed matters pass into the blood-vessels or the lymphatics in some way the details of which are as yet mere matters of speculation.

While it is probable that the liver modifies the recently-digested raw material of food before it reaches the common stock of the blood, it is quite unknown what (or, indeed, if any) difference exists between the action of the liver on blood laden with raw material immediately after a meal and its action on blood traversing its capillaries during a fast. Does the liver exert an action on recently-imported fat, peptones, and sugar in any sense different from the action it exerts on fatty, albuminous, and sugary matters as they exist in the common stock of blood? Or—which is the same question—do the fats, albuminous matters, and sugars of the portal blood differ at all from the fats, albuminous matters, and sugars of ordinary blood? While this question remains unanswered it will be well to consider the liver as like any other tissue drawing on the common source of nutriment, the blood, for its own particular purposes, and not as an organ akin to the special digestive organs, devoted to the elaboration of food for the benefit of the other tissues.

It need not be so, however, with the lymphatic structures with which the chyle of the lacteals comes into contact before it is poured into the blood. Chyle from the thoracic duct at its entrance into the veins is of course mixed with the general lymph of the body—the juice of the tissues which is collected in the lymph-vessels and carried back to the blood. It is a milky fluid which coagulates on standing, the clot of which after some time becomes tinted red at the surface from the presence of immature red corpuscles. The coagulum consists of fibrin resembling that of the blood. Other constituents of chyle are white corpuscles, oil-globules coated with albuminous matter, *i.e.*, emulsified, and exceedingly fine fatty granules usually spoken of as the “molecular basis of chyle.” Chyle obtained from vessels nearer the intestines has very little fibrin, very few white corpuscles, and no red corpuscles. It is probable, therefore, that the raw matters of digested food are undergoing a process of manufacture into blood during their passage through the lymphatic glands to reach the thoracic duct.

When once they arrive at the blood, the imported materials of food are lost beyond our power to follow them individually. The question now becomes one of the interchanges between the blood generally and the tissues. That such an interchange occurs there can be no doubt; for if all food be withheld from an animal the tissues rapidly grow less in quantity, while the blood maintains a fairly constant composition. If such an animal be fed, the tissues regain their former weight, and may even store up an overplus of matters, while again the blood remains of approximately constant composition. The tissues can both take away from the blood and give to the blood such matters as are necessary. But the matters taken from the blood are not in the same form as the matters given up to the blood. When blood is made to circulate through living tissues of whatever kind the blood entering the tissue always has a different composition from the blood which leaves it. The tissues, therefore, are laboratories in which materials abstracted from the blood are transformed. To these chemical operations of transformation which occur in living tissues the term “metabolic” has been applied, a term first used by Schwann, and reintroduced by Michael Foster.

What now becomes of the products of the metabolic activity of the tissues? We have hitherto considered the tissues as taking matter from the blood, changing

the form of it, and giving it back to the blood; but this is far from being the true account of the process. It does indeed represent all that we know of the metabolism of many tissues. In muscle, for example, matters are drawn from the blood, converted to other shapes within the tissue, and sooner or later cast out into the blood-current again. The same may be said of nerve-tissue and possibly of some other tissues. In secreting glands the case is different. Some only of the products of tissue-metabolism are returned to the blood; others are poured into the ducts of the glands as the glandular secretion, and so leave the body altogether. This happens, for example, in the digestive glands, the milk-glands, and the kidneys. In a third order of tissues the case is different again, for here some of the products of metabolism may be retained in the tissue for an indefinite time. This occurs in certain tissues which have been called storage tissues, and of which fat is a typical example. Lastly, the liver is a complex organ whose metabolic products are disposed of in all three ways—part being cast at once into the blood, part being accumulated in the tissue itself as glycogene and passing into the blood at intervals as the body needs it, and a third part being poured into the biliary ducts in order that it may escape into the intestine.

We have hitherto regarded the blood as subordinately related to the great processes of the body, as playing the mechanical part of a carrier, and as if it had no *direct* interest in the metabolic operations themselves; the reader, however, need scarcely be reminded that, but for the respiratory exchanges between the blood on the one hand and the anatomical elements of the tissues on the other, all metabolic processes would be impossible. In the article RESPIRATION, and in treating the particular section “the respiration of the tissues,” the influence of those exchanges on metabolism will be carefully considered.

The older physiologists regarded the blood as the very seat of the chemical changes of the body—a view which is almost entirely opposed to that which we now hold, and which is disproved by many facts.

We have little or no evidence that the blood exhibits transformations of matter such as the tissues generally. There are few such transformations known to us in which carbonic acid is not one of the most abundant end-products of the change, and, therefore, when we find that blood removed from contact with the tissues and freed from carbon dioxide produces very little of this body, although an abundance of oxygen be supplied to it, we have the right to suspect strongly that it is due to the absence of any active metabolism.

The blood is subject to continual additions and subtractions on the part of the tissues. The subtractions effected by the tissues are made good in part by the importation of fresh material of food from the alimentary canal. The analogous counterbalancing operations which serve to check the accumulation of used-up tissue-substance in the blood take place in certain organs called *excretory*. In a strict sense, all organs which cast out material from the body are excretory; the digestive glands, for example, pour their secretions into the alimentary canal, *i.e.*, outside the strict limits of the body. But so much of their constituents are reabsorbed before the alimentary canal is traversed that they may, for practical purposes, be regarded as never having left the body. Even the constituents of tears, when these do not fall over the cheeks or escape at the nose, are reabsorbed from the nasal mucous membrane. With respect to the alimentary secretion, it is merely a small proportion of the bile which remains in the fæces that is to be regarded as truly excretory in the sense of being utterly lost to the

organism. If excreta are those substances which the body rejects utterly, then we may reckon as excreta (1) the urine, (2) the sweat and oily secretions of the skin, (3) the milk, (4) certain elements of bile contained in the faeces, (5) the gaseous and watery losses of the lungs, (6) the exuviated horny scales of skin and nails and hair, (7) the products of the generative organs, but not those constituents of faeces which are but the undigested remains of food. Among these (if we except the milk and the generative secretions whose elaboration is so peculiar and exceptional) the urine and the excretory products of the lungs and skin are those of paramount importance. The excretion from the lungs will be treated under RESPIRATION; we shall therefore here concern ourselves with the excretion of kidneys and skin.

Urine is a clear, amber-colored fluid, somewhat acid in reaction, with a peculiar aromatic odor and bitter saline taste. Its specific gravity varies, consistently with health, within wide limits, being affected very greatly (*a*) by the quantity of liquid consumed by the individual in a given time, (*b*) by the greater or less activity of the secretion of sweat. While the average specific gravity may be stated to be about 1.020, it is often temporarily much lower and occasionally considerably higher. As a rule the specific gravity is higher in summer than in winter. The average quantity of urine passed by a healthy adult may be reckoned at fifty-two fluid ounces, though it is affected by the same causes as those which influence the specific gravity no less than by individual peculiarity and other circumstances.

The urine is essentially a watery solution of certain organic matters, of which much the most abundant and important is urea, and of mineral salts, of which the most abundant is common salt (sodium chloride).

The urine is excreted continuously in the *kidneys*, two organs situated at the back of the abdominal cavity. The fluid is continuously poured by two ducts called *ureters* into a common reservoir situated in the pelvis, and known as the *urinary bladder*. From this reservoir the urine is intermittently ejected by the *urethra*. The two kidneys never secrete symmetrically; they exhibit an alternation of vascular and secretory activity. Similar variations have been observed in the different portions of one kidney—first one and then another region of the kidney will be found to be in full activity. Nevertheless, when one kidney is extirpated or unfitted for its function, the other may be capable of the whole work of excretion.

The excretory portion of the kidney, like the secretory portion of all glandular organs, consists of tubes of basement membrane lined with cells of peculiar attributes and surrounded by capillaries for blood and lymph, which allow their fluids to come into close communication with the secreting cells. The complex disposition of the tubes, of which there are hundreds in each kidney, has been traced after an infinite amount of patient research. An account of the arrangement of the tubuli uriniferi falls beyond the scope of the present article.

Excretion of Urine.—A review of the constituents of the urine discloses that the function of the kidneys is to separate from the blood chiefly (1) nitrogenous crystalline bodies which are undoubtedly the end-products of the oxidation of nitrogenous bodies, and (2) inorganic salts and water. Ever since the whole course and form of the renal tubules became mapped out, and the existence of a double system of capillaries was established, it has been the habit of physiologists to regard the excretion of urine as a twofold operation. Sir William Bowman, so long ago as 1842, in the course of a histological investigation of the structure of the

kidney, came to the conclusion that the watery portions of the urine are excreted in the capsule, while the solid parts are removed from the blood surrounding the lower parts of the renal tubule.

The second great excretory system is that of the skin, which supplements in important particulars the excretory functions of the kidneys. This function of the skin is effected in great measure by certain glands, called sweat-glands, opening on the surface of the skin. There are, indeed, other glands besides the sweat-glands connected with the skin, viz., the sebaceous glands, which open chiefly into the sacs of hair-follicles and secrete an oily material which keeps the surface of the skin supple and water-tight. The sebaceous secretion resembles in formation the secretion of milk. Inasmuch as it is not reabsorbed, it is a true excretion; but there is reason to believe that the material removed from the blood is elaborated out of complex fat-yielding molecules contained in the blood very much as the milk is secreted. We know very little either of the nature of the bodies excreted or of the processes of their formation. The chief excretory products of the skin are furnished by the sweat-glands, and constitute sweat. In addition, however, there is constantly being thrown off from the skin a certain quantity of carbonic acid.

It is impossible to collect sweat for analysis under perfectly normal conditions; either the body must be subjected to great heat to adduce a copious flow, or a part of the body must be inclosed in an air-tight bag of india-rubber. In both cases the conditions are abnormal. So far as can be ascertained, the sweat is a colorless clear fluid of acid reaction and characteristic odor. The odor varies with the part of the skin from which the sweat is obtained. It consists of water containing 1.81 per cent. of solids. The lungs (looked at as excretory organs), the kidneys, and the skin are all engaged in the great task of ridding the system of its superfluous matters, and each supplements the actions of the others. The lungs are the great excretors of carbonic acid, which is the chief oxidation product of the body, though they share with the kidneys and skin the task of getting rid of water. The kidneys have thrown upon them the task of removing from the system nearly the whole of the nitrogenous waste products and the superabundant salts, besides being the great excretors of water. The skin, on the other hand, looked upon as an excretory organ, is second in importance to the kidneys as a remover of water, and comes next to the lungs in separating carbonic acid. The skin, it must be remembered, however, has many functions besides those of an excretory organ, for, besides being an organ of sense, it takes the chief part in regulating the temperature of the animal body.

The chemical changes which occur in all the tissues and organs of the body are, in the main, processes of oxidation, in which energy that was potential in the organic compounds and the oxygen that takes part in them become in great part kinetic. This energy takes the form of mechanical work and heat; the mechanical work is in part expended within the body itself and ultimately takes the form of heat; in part, however, it is expended upon the objects of the external world, and, though even then ultimately transformed into heat, this is not heat which is available for the purposes of the body. There can be no doubt, however, that a large portion of the total heat evolved in the body is the immediate result of chemical operations, and has not in the first instance taken the form of mechanical work.

The total income and expenditure of energy of an average man in twenty-four hours is calculated to correspond to the amount of heat required to raise 595

pounds of water from the temperature of melting ice to that of boiling water.

Where, it will be asked, does this transformation of energy chiefly have its seat? The answer to this question is that it is firstly in the muscles, then in the glands of the body. At all times, whether in rest or activity, heat is evolved, but the quantity increases in the case both of glands and of muscles as they pass from the former into the latter condition. In the resting body the losses of energy are represented by the loss of heat, for the mechanical work done within it takes the form of heat within the body itself. It is difficult, nay, impossible, to calculate the amount of energy which in the first instance takes the form of mechanical work in the body, and which is always transformed into heat. The case of the heart is one in which, however, an approximate calculation can be made. Upon fairly reliable data it has been calculated that the work expended by the heart of a man in twenty-four hours amounts to not less than 627,768 foot-pounds, an amount of work which is equivalent to nearly forty-five pound-units of heat, and which represents the energy evolved as heat in the complete combustion of about 386 grains of carbon.

Different animals, like steam-engines of different construction, vary in the proportion borne by the external work they are capable of performing to the total energy which becomes kinetic. Experiments made with the separate muscles of animals, no less than observations on the relation between the external mechanical work done by and the total heat evolved in the body of animals, have, however, shown that animals are more economical machines than the most perfect steam-engines. While the latter cannot convert more than one-eighth of their available energy into work, the animal may yield as much as one-fifth of its energy in the form of available external work.

In the adult body in a state of health the income of matter balances as nearly as possible the expenditure, and therefore the weight of the body and its dimensions remain nearly constant, and the same is approximately true of the different organs and tissues which compose the body, as well as of the anatomical elements which enter into their formation. Even when the conditions to which the organism is subjected undergo great variations—as, for instance, when from a state of rest it passes into a state of great activity, or when the temperature of the medium which it inhabits undergoes great changes—and when, to meet these variations in external circumstances, the rate of the exchanges of matter has to undergo great fluctuations, the weight of the body remains nearly constant. This remarkable result is one which doubtless depends upon a great many factors which are for the most part hidden from us.

In the growing body matters are, however, very different; in it normally the income must be always so much in excess of the expenditure that an accumulation of capital may occur and that the body may increase in weight and in dimensions. The growing body is always the seat of a more active exchange of matter than the fully developed body, *i.e.*, weight for weight, it requires more food and oxidizes it more rapidly.

The increase of weight and of dimensions occurs in part by addition of matter to, and increase in weight and in dimensions of, individual organs and their constituent anatomical elements; in part, however, it is due to an actual multiplication of anatomical elements occurring at a rate which greatly exceeds that which occurs in the adult body. To what an extent this multiplication occurs and how it gradually diminishes is evident when we reflect that the whole

organism was originally derived from a single cell, the ovum.

Upon what depends this tendency to multiplication of anatomical elements, and this tendency to increase in size of individual anatomical elements or of organs, until a certain approximate limit has been attained, is absolutely unknown. We know to a certain extent that the process of *growth* depends upon and is influenced by certain circumstances, as amount of food, temperature, blood-supply to the particular organ, and so on, but yet the knowledge is wanting which would tell us why, when a certain limit has been attained, the process of income and expenditure balance and growth ceases.

Scarcely less mysterious than the primary causes of growth is the fact that every organism having arrived at maturity remains in a state of apparent structural and functional integrity for a term which possesses an approximately constant mean value for each species, and then sooner or later necessarily passes into a condition of gradually lessening efficiency, which ultimately terminates in death. Were the animal organism a machine undergoing a constant though very slow process of waste, its decay and ultimately its death would be more obvious than they actually are. The organism, however, differs from the machine in that its matter is continually the seat of change, and that during long periods (*i.e.*, during healthy adult life) the processes of gain and loss of matter appear to be going on with perfect evenness and equality. Why, then, the ultimate deterioration resulting in waste and then in death? The answer is that the organ as a whole unquestionably does suffer by work, and, though at first the degree of impairment is so slow as to be imperceptible, it doubtless is a continuous process.

A general impairment of the mechanism of the body as it passes from the age of mature or adult life into old age is evidenced (1) by a diminished rate in the exchange of matter of the body; (2) by a diminished power manifested by the organism as a whole, as well as by each of its individual organs, to accomplish work; (3) by a general loss of weight of the body and of its essential tissues and organs, though the weight of the body as a whole may increase by the development and storage of fat; (4) by a tendency to structural change of organs or parts of organs whose proper function is essential to life, as, for example, of the circulatory, respiratory, and nervous apparatuses; (5) by a readiness to be injuriously affected by external circumstances, which at an earlier period produce no obvious effect upon the body or only temporary impairment of its functions. The gradual and general deterioration of the organism thus evidenced is usually interrupted by the supervention of some process impairing so greatly the functions of a vital organ that the organism as a whole ceases to perform the functions which characterize it as living, and death results. Whatever the remote cause of death, the proximate cause is in every case an arrest of the circulation of the blood, putting an end to the exchanges of matter and energy which are the most characteristic of the accompaniments of life.

NUTTALL, THOMAS, botanist and ornithologist in the United States, where he lived and worked from 1808 until 1842, was born at Settle, in Yorkshire, in 1786, and spent some years as a journeyman printer in England. Soon after coming to the United States he was induced by Professor Barton to apply himself to the study of the plants; and in pursuance of his investigations he undertook many long and arduous as well as dangerous journeys, usually spending the summers in the field and the winters in working out the materials accumulated during his expeditions. In 1822 he was

appointed curator of the botanic gardens of Harvard University, but continued his explorations, and in 1834 crossed the continent to the Pacific Ocean, and visited the Sandwich Islands. Some property having been left him in England on condition of his residing on it during part of each year, he left America in 1842, and did not again revisit it, except for a short time in 1852. He died at St. Helen's, Lancashire, September 10, 1859.

NUX VOMICA, a poisonous drug, consisting of the seed of *Strychnos Nux-Vomica*, L., a tree indigenous to most parts of India, and found also in Burmah, Siam, Cochin China, and northern Australia. The tree, which belongs to the natural order *Loganiaceæ*, is of moderate size, with a short, thick, often crooked stem, and ovate entire leaves, marked with five, six or seven veins radiating from the base of the leaf. The flowers are small, greenish-white, and tubular, and are arranged in terminal corymbs. The fruit is of the size of a small orange, and has a thin, hard shell, inclosing a bitter, gelatinous, white pulp, in which from one to five seeds are vertically imbedded. The seed is disk-shaped, rather less than one inch in diameter, and about one-quarter of an inch in thickness, slightly depressed toward the center, and in some varieties furnished with an acute keel-like ridge at the margin. This is particularly the case with the seeds imported from Bombay and collected in that province. Those imported from Madras and Cochin China have usually a rounded margin. The acute margin is considered in commerce indicative of superior quality, seeds so characterized yielding the largest quantity of the active principles.

The drug owes its poisonous property chiefly to the alkaloids *strychnia* and *brucia*, the mixed alkaloids found in the seed being in the proportion of about 1 per cent. of the former to 2 per cent. of the latter. These alkaloids occur in the seeds in combination with a probably complex body which has been named strychnic or igasuric acid. *Brucia* is distinguished from *strychnia* by giving a red color when moistened with strong nitric acid, and by being soluble in 150 parts of boiling water, while *strychnia* requires 2,500 parts for its solution. It is remarkable that although the pulp contains *strychnia* it is not poisonous to birds, being eaten by the hornbill, *Buceros malabaricus*, and other species. Parasitic plants of the natural order *Loranthaceæ*, when growing on *Strychnos Nux-Vomica*, acquire the poisonous properties of the latter.

NYACK, a village of Rockland county, N. Y., twenty-eight miles from New York city. It has manufactures of boots and shoes, boilers, wooden-ware, and other articles, contains a national bank and savings bank, several large summer hotels, six churches, and good schools. Its population (1890) is 6,000.

NYANZA. For Albert Nyanza and Victoria Nyanza, see **NILE**.

NYASSA, LAKE. See **ZAMBESI**.

NYBORG, a town and seaport of Denmark, on the east side of the island of Fünen, 28¼ miles by rail east of Odense, and the point from which the steam-packets cross the Great Belt to Korsör in Zealand. Population, 2,000.

NYIREGYHÁZA, a town of Hungary, in the district of Szabolcs, is situated at the junction of the river Theiss and the railways at the northeast of Hungary, thirty miles to the north of Debreczin. It contains four churches, a gymnasium, and a mineral bath. The inhabitants of the town, who numbered 24,102 in 1880, are engaged in agriculture, wine-growing, and the manufacture of soda, matches, and saltpeter. A little to

the northwest is the famous wine-producing district of Tokay, which yields about 18,000,000 gallons of wine annually, including 3,000,000 or 4,000,000 gallons of genuine Tokay.

NYKÖPING, a city of Sweden, the chief town of the province of Nyköping (Södermanland), is situated on both banks of a stream which unites Lakes Yngaren, Tisaren, etc., with By Fjord, and so with the Baltic. Connected by a branch line with the railway from Stockholm to the Norwegian frontier, it lies about 100 miles by rail southwest of Stockholm. Population, 5,000.

NYLGHAU, or **NIL-GAI**, one of the largest of the antelopes, a handsome and graceful animal, with short, straight, erect horns, pointed and turned slightly forward at the tips, and present in the male only. It has a short erect mane, and the male has also a tuft of hair on the throat. When adult the sexes are very different in color, the male being generally of a dark iron-gray or slate color, approaching black on the head and legs, while the female and young are of a bright light-brown or fawn color. In both male and female at all ages, the lips, chin, and under-parts as well as two transverse stripes on the inner sides of the ears and rings on the fetlocks are white, and the mane and tip of the tail black. The horns are black, and from eight to nine inches long. The male stands about four feet four inches high at the shoulder, the female is smaller. The tail is eighteen to twenty-one inches in length.

The Nylghau is one of the few true antelopes occurring in India, and is peculiar to that country, being found from near the foot of the Himalayas to the south of Mysore, though rare to the north of the Ganges and also in the extreme south. It is most abundant in central India, and does not occur in Assam or the countries to the east of the Bay of Bengal.

NYMPH. The belief that the nature which surrounds mankind—the woods, the springs, the hills—is full of a life resembling, yet different from, human life, is universal in a primitive stage of thought. At Psophis in Arcadia a row of tall cypress-trees was called the damsels. There is a close relation between the souls of dead men and the life of nature; the Nymphs often play the part of death and carry away human beings to dwell with them. This idea appears in a slightly different form when heroes and favored mortals live in communion with them. The connection of a human being with a Nymph has something unnatural about it, and almost always brings some disaster on the mortal. He whose mind the Nymphs take possession of loses his human wit and becomes mad, but has wisdom more than human. The worship of the Nymphs was practiced throughout the classical period in places where they seemed to have chosen a home for themselves, in shady groves and beside springs of clear water. It retained its native simplicity. No temple, no statue, no priest was needed; the offerings of a rural people were placed on the simple altar. The cultus is, therefore, not often mentioned in literature; but it appears to have been closely connected with the household life of the people, and to have had a strong hold on them. Among the ceremonies of marriage an acknowledgment of the power of the Nymphs was included. The bride, herself a *Nymphe*, was sprinkled with water from the fresh spring of the Nymphs, or she went to bathe in the spring. The Nymphs, the ever-youthful spirits of nature, protected and nourished children; they were themselves often, especially in Asia Minor, the mothers of the heroes of the land.

O.

O. The history of the symbol O is parallel to that of E. Each represents several sounds which are distinguished habitually in speech without any difficulty, but for which, owing to the imperfection of the English alphabet, there are no separate symbols. Probably the confusion is worst in English; but French and Italian also have more sounds for each of these symbols than can be properly included under them, and so they distinguish these sometimes by diacritical marks, as *ò* or *ó*, and sometimes they do not distinguish at all.

The different sounds which *is* used to denote in English lie, with one exception, on the line between the pure *a*-sound and the pure *u*-sound. We have already seen that *e* denotes several different sounds on the other line—that between pure *a* and pure *i*. The difference between the sounds on these two lines is this. In the *a—i* line only the tongue is employed; it is raised more and more for each successive sound. But in the *a—u* line the tongue is not the only agent; the cavity of the mouth is also contracted, so that the passage is narrowed, and the lip-aperture is lessened more and more for each sound; in technical phrase the lips are “rounded,” so that for *u* the aperture is the smallest possible to allow of the utterance of a true vowel, hence the great ease with which the *u*-sound passes into a *w*, in which there is friction caused by the still greater closing of the lips, and therefore we have a consonant, not a vowel, sound.

The following different sounds—denoted by O in English—are readily discriminated. Beginning from the *a*-end of the line, we come first to the sounds heard in “not” and in “lord;” for both of these the back of the tongue is much depressed and the lips are only slightly rounded. The difference between the two sounds consists in this—for the first the back of the tongue is more convex than for the second; the passage is therefore somewhat narrowed, and the two corresponding sounds are therefore (here and in all other similar pairs) known technically as “narrow” and “wide,” or as “open” and “close.” The narrow sound is written by *o* in English when *r* or *l* follows, and the wide is written *aw* as in “law,” or *au* as in “Paul,” or even *a* as in “pall.” The next pair may be exemplified by “pole” and “pour,” narrow and wide respectively; for these the tongue is higher and the rounding greater. Here again several digraphs represent the same sound, as in “foal,” “soul,” “hoe,” “grow.” Next the doubled *o* is generally used to represent the last sound in the scale, the close *u*, for which the tongue is highest and the “rounding” greatest, as in “pool;” but in “rule” and others the same symbol is used for this sound as would be used in other European languages. Lastly—the exception mentioned above—*o* is one of the symbols employed to denote the neutral vowel, as in “son,” as well as *u* in “sun” and *a* in “final.”

CAJACA, or OAXACA, the chief town of the province of the same name in Mexico, lies 1,600 feet above the sea in a beautiful valley on the left bank of the Ato-

yac, or Rio Verde, which reaches the Pacific after a course of about 170 miles. The city is surrounded by luxuriant gardens, orchards, and cochineal plantations; its streets are wide and regular, and among its public buildings are the cathedral, the bishop’s palace (fashioned after the type of a similar ancient edifice at Mitla), and the Dominican monastery and church. Chocolate, cigars, cotton cloth, wax candles, etc., are manufactured. Population, 10,000. The city, which dates from 1522, was visited by a severe earthquake in 1870.

OAK, a word found, variously modified, in all Germanic languages, and applied to plants of the genus *Quercus*, a well-marked section of the natural order *Corylaceæ* (*Cupuliferæ* of De Candolle), including some of the most important timber-trees of the north temperate zone. All the species are arborescent or shrubby, varying in size from the most stately of forest trees to the dwarfish bush. Monoecious, and bearing their male flowers in catkins, they are readily distinguished from the rest of the Cupuliferous family by their peculiar fruit, an acorn or nut, inclosed at the base in a woody cup, formed by the consolidation of numerous involucre bracts developed beneath the fertile flower, simultaneously with a cup-like expansion of the thalamus, to which the bracteal scales are more or less adherent. The ovary, three-celled at first, but becoming one-celled and one-seeded by abortion, is closely invested by the perianth, toothed on the margin, and adherent below; the male flowers are in small clusters on the usually slender and pendent stalk, forming an interrupted catkin; the stamens vary from six to twelve. The alternate leaves are more or less deeply sinuated or cut in most of the species, but in some of the deciduous and many of the evergreen kinds are nearly or quite entire on the margin. The oaks are widely distributed over the temperate parts of Europe, Asia, North Africa, and North America. In the western hemisphere they range along the Mexican highlands and the Andes far into the tropics, while in the Old World the genus, well represented in the Himalayas and the hills of China, exists likewise in the peninsula of Malacca, in Java, and in some other islands of the archipelago, several species occurring in the Moluccas and Borneo. On the mountains of Europe and North America they grow only at moderate elevations, and none approach the arctic circle. The multitude of species and the many intermediate forms render their exact limitation difficult, but those presenting sufficient marked characteristics to justify specific rank probably approach 300 in number.

The well-known *Q. Robur*, one of the most valued of the genus, and the most celebrated in history and myth, may be taken as a type of the oaks with sinuated leaves. Though known in England, where it is the only indigenous species, as the British oak, it is a native of most of the milder parts of Europe, extending from the shores of the Atlantic to the Ural; its most northern limit is attained in Norway, where it is found wild up to latitude 63°, and near the Lindesnæs forms woods of some

extent, the trees occasionally acquiring a considerable size. In western Russia it flourishes in latitude 60° , but on the slope of the Ural the 56th parallel is about its utmost range. Its northern limit nearly coincides with that of successful wheat cultivation. Southward it extends to Sardinia, Sicily, and the Morea. In Asia it is found on the Caucasus, but does not pass the Ural ridge into Siberia. In Britain and in most of the Continental habitats two varieties exist, regarded by many as distinct species: one, *Q. pedunculata*, has the acorns, generally two or more together, on long stalks, and the leaves nearly sessile; while in the other, *Q. sessiflora*, the fruit is with or without a very short peduncle, and the leaves are furnished with well-developed petioles. The British oak is one of the largest trees of the genus, though old specimens are often more remarkable for the great size of the trunk and main boughs than for very lofty growth. The spreading branches have a tendency to assume a tortuous form, owing to the central shoots becoming abortive, and the growth thus being continued laterally, causing a zigzag development, more exaggerated in old trees and those standing in exposed situations; to this peculiarity the picturesque aspect of ancient oaks is largely due.

Vast oak forests still covered the greater part of England and central Europe in the earlier historic period; and, though they have been gradually cleared in the progress of cultivation, oak is yet the prevailing tree in most of the woods of France, Germany, and southern Russia, while in England the coppices and the few fragments of natural forest yet left are mainly composed of this species. The great regard paid to the oak probably originated in the value attached to its timber and fruit; the largest and most durable of European trees, its wood was looked upon as the most precious produce of the forest. With both Greek and Roman it was the favorite timber for house, bridge and ship building; and the furrowed columns with spreading base that upheld their stone-built temples of historic age seem to indicate the oak-trunk as their archaic prototype. The tree was not in less esteem among the Teutonic nations; the long ships of the Northmen were hewn from the same "heart of oak" of which the warships of England were until lately constructed. The oak of Britain is still in great demand for the construction of merchant shipping, though teak has become in some measure its substitute, and foreign oak of various quality and origin largely takes its place. Its great abundance of curved trunks and boughs rendered the oak peculiarly valuable to the shipwright when the process of bending timber artificially was less understood; the curved pieces are still useful for knees. The younger oaks are employed by the carpenter, wheelwright, wagon-builder, and for innumerable purposes by the country artisan. The most durable of fences are those formed of small oaks, split lengthwise by the wedge into thin boards. The finely-grained heart-wood is sought by the cabinetmaker for the manufacture of furniture, and high prices are often given for the gnarled and knotted portions of slowly-grown trees, to be sawn into veneers. Oak was formerly largely used by wood-carvers, and is still in some demand for those artists, being harder and more durable than lime and other woods that yield more readily to the sculptor's tool. The wood, of unknown age, found submerged in peat-bogs, and of a black hue, is largely used in decorative art under the name of "bog-oak."

The oak grows most luxuriantly on deep, strong clays, calcareous marl, or stiff loam, but will flourish in nearly any deep, well-drained soil, excepting peat or loose sand; in marshy or moist places the tree may grow well for a time, but the timber is rarely sound; on hard, rocky

ground and exposed hillsides the growth is extremely slow and the trees small, but the wood is generally very hard and durable. The tree will continue to form wood for 150 to 200 years before showing any symptoms of decay. As firewood oak holds a high position, though in Germany it is considered inferior to beech for that purpose. It makes excellent charcoal, especially for metallurgic processes; the Sussex iron, formerly regarded as the best produced in Britain, was smelted with oak charcoal from the great woods of the adjacent Weald, until they became so thinned that the precious fuel was no longer obtainable.

An important product of oak woods is the bark, that from a remote period has been the chief tanning material of Europe. The most valuable kind is that obtained from young trees of twenty to thirty years' growth, but the trunks and boughs of timber-trees also furnish a large supply; it is separated from the tree most easily when the sap is rising in the spring. It is then carefully dried by the free action of the air, and when dry built into long, narrow stacks until needed for use. The value of oak bark depends upon the amount of tannin contained in it, which varies much, depending not only on the growth of the tree, but on the care bestowed on the preparation of the bark itself, as it soon ferments and spoils by exposure to wet, while too much sun-heat is injurious.

The acorns of the oak possess a considerable economic importance as food for swine. In the Saxon period the "mast" seems to have been regarded as the most valuable produce of an oak wood; nor was its use always confined to the support of the herds, for in time of dearth acorns were boiled and eaten by the poor as a substitute for bread in both England and France, as the sweeter produce of *Q. Esculus* is still employed in southern Europe. Large herds of swine in all the great oak woods of Germany depend for their autumn maintenance on acorns.

The oak grows well in the northern and middle United States; and, from the superiority of the wood to that of *Q. alba* and its more abundant production of acorns, it will probably be much planted as the natural forests are destroyed. The young trees require protection from storms and late frosts even more than in England; the red pine of the northeastern States, *Pinus resinosa*, answers well as a nurse, but the pitch pine and other species may be employed. In the southern parts of Australia and in New Zealand the tree seems to flourish as well as in its native home.

In North America, where the species of oak are very numerous, the most important member of the group is *Q. alba*, the white oak, abounding all over the eastern districts of the continent from Lake Winnipeg and the St. Lawrence countries to the shores of the Mexican Gulf. In aspect it more nearly resembles *Q. Robur* than any other species; forming a thick trunk with spreading base and, when growing in glades or other open places, huge spreading boughs, less twisted and gnarled than those of the English oak and covered with a whitish bark that gives a marked character to the tree. The leaves are large, often irregular in form, usually with a few deep lobes dilated at the end; they are of a bright, light green on the upper surface, but whitish beneath; they turn to a violet tint in autumn. The egg-shaped acorns are placed singly or two together on short stalks; they are in most years sparingly produced, but are occasionally borne in some abundance. On rich loams and the alluvial soils of river-valleys, when well drained, the tree attains a large size, often rivaling the giant oaks of Europe; trunks of three or four feet in diameter are frequently found, and sometimes these dimensions are greatly exceeded. The wood

is variable in quality and, though hard in texture, is less durable than the best oak of British growth; the heart-wood is of a light, reddish-brown varying to an olive tint; a Canadian specimen weighs fifty-two and one-quarter pounds the cubic foot. In the United States it is largely used in shipbuilding, for house timber, and many other purposes; wheels and the frames of wagons and sleighs as well as casks are often made of it; large quantities are exported to England from Canada. The young wood is very strong, flexible, and elastic; it is split into thin strips, to be made into baskets. The large roots, often presenting a very fine grain and taking a good polish, are sought for by the cabinet-maker. The bark is inferior to that of many oaks.

Q. obtusiloba, the post oak of the backwoodsman, a smaller tree with rough leaves and notched upper lobes, produces an abundance of acorns and good timber, said to be more durable than that of the white oak.

The pin oak, sometimes called the "over-cup" oak, *Q. macrocarpa*, is remarkable for its large acorns, the cups bordered on the edge by a fringe of long, narrow scales; the leaves are very large, sometimes from ten inches to a foot in length, with very deep lobes at the lower part, but dilated widely at the apex, and there notched. The tree is not of large growth, but its tough wood is useful for bolts and trenails; it is sometimes called the "burr-oak."

The true over-cup oak, *Q. lyrata*, is a large tree, chiefly found on swampy land in the southern States; the lyrate leaves are dilated at the end; the globose acorns are nearly covered by the tuberculated cups.

In the woods of Oregon, from the Columbia river southward, an oak is found bearing some resemblance to the British oak, in foliage and in its thick trunk and widely spreading boughs, but the bark is white as in *Q. alba*; it is *Q. Garryana*, the western oak of Nuttall. This tree acquires large dimensions, the trunk being often from four to six feet in diameter; the wood appears to be good, but experience has scarcely tested its durability; the acorns are produced in great quantity, and are used by the Indians as food.

The red oak, *Q. rubra*, has thin large leaves on long petioles, the lobes very long and acute, the points almost bristly; they are pink when they first expand in spring, but become a bright glossy green when full grown; in autumn they change to the deep purple-red which gives the tree its name. Common throughout the northern and middle States and Canada, the red oak attains a large size only on good soils; the wood is of little value, being coarse and porous, but it is largely used for cask-staves; the bark is a valuable tanning material.

A species nearly allied is the scarlet oak, *Q. coccinea*, often confounded with the red oak, but with larger leaves, with long lobes ending in several acute points; they change to a brilliant scarlet with the first October frosts, giving one of the most striking of the various glowing tints that render the American forests so beautiful in autumn. The trunk, though often of considerable size, yields but an indifferent wood, employed for similar purposes to that of *Q. rubra*; the bark is one of the best tanning materials of the country. Both these oaks grow well in British plantations, where their bright autumn foliage, though seldom so decided in tint as in their native woods, gives them a certain picturesque value.

The chestnut oaks of America represent a section distinguished by the merely serrated leaves, with parallel veins running to the end of the serratures. *Q. Prinus*, a beautiful tree of large growth, and its sub-species *Q. castanea* and *Q. montana*, yield timber little inferior to white oak. *Q. Chinquapin* or *prinoides*, a dwarf

variety, often only a foot in height, forms dense miniature thickets on the barren uplands of Kansas and Missouri, and affords abundant sweet acorns; the tree is called by the hunters of the plains the "shin-oak."

Evergreen oaks with entire leaves are represented in North America by *Q. virens*, the live oak of the southern States; more or less abundant on the Atlantic coasts of Carolina and Florida, its true home is the country around the Mexican Gulf, where it rarely grows more than fifty or sixty miles inland. The oval leaves are dark green above, and whitish with stellate hairs beneath, the margin entire and slightly recurved. The live oak is one of the most valuable timber-trees of the genus, the wood being extremely durable, both exposed to air and under water; heavy and close-grained, it is perhaps the best of the American oaks for shipbuilding, and is invaluable for water-wheels and millwork. Live oaks grow but slowly, and few large trees are left in the settled districts; but when standing in open places the trunk sometimes attains a great size, and an old tree, with its far-spreading boughs, often clothed with the beard-like "Spanish moss," has a peculiarly venerable aspect. One growing at Grove Creek, near Charleston, is said to have attained a girth of forty-five feet at the ground; trees of twelve feet in circumference were formerly not infrequent. The stalked oblong acorns in elongated cups are pleasant in taste, and were eaten by the Indians of Texas.

In America several oaks exist with narrow lanceolate leaves, from which characteristic they are known as "willow oaks." *Q. Phellos*, a rather large tree found on swampy land in the southern States, is the most important of this group; its timber is of indifferent quality.

The cork oak, *Q. Suber*, has been described in a preceding article (CORK). In Spain the wood is of some value, being hard and close-grained, and the inner bark is used for tanning. From its rugged silvery bark and dark-green foliage, it is a handsome tree.

OAKAPPLE, or OAKGALL. See GALLS.

OAKLAND, a city in Alameda county, Cal., lies opposite San Francisco, of which it is practically a residential suburb, on the eastern shore of San Francisco Bay, at the terminus of the Central Pacific Railroad. Its beautiful situation, its shady streets, and the excellent quality of its buildings make it a distinctly attractive place. A branch of the bay, dividing the city into East and West Oakland, forms a good harbor, but is obstructed by a bar. The railway pier, two miles long contains a number of warehouses and is traversed by a broad carriage road. Among the local industrial establishments are flour-mills, planing-mills, potteries, tanneries, and a jute-factory turning out 5,000,000 sacks per annum. Oakland, deriving its name from a grove of oaks in the midst of which it was built, was incorporated as a city in 1854. Its population was 1,549 in 1860, 10,500 in 1870, 34,555 in 1880, and 48,682 in 1890.

OAKUM is a preparation of tarred fiber used in shipbuilding, for calking or packing joints of timbers in wood vessels and the deck planking of iron and steel ships. Oakum is made by preference from old tarry ropes and cordage of vessels, its teasing and preparation being a common penal occupation in prisons.

OAMARU, a municipal borough on the coast of Otago, New Zealand (South Island), seventy-three miles by rail north from Dunedin, is a thriving seaport. It is the outlet of the largest agricultural district in New Zealand. It is on the main railway between Christchurch and Dunedin, and is connected by branch lines with fertile inland districts. A breakwater and mole,

constructed of blocks of concrete like those used at Port Said in Egypt, inclose a large and commodious basin in what was an open roadstead; and the harbor is one of the safest in the colony, and capable of accommodating very large ships. Population, 8,000.

OAR-FISH, a fish of the family of ribbon-fishes (*Trachypteridæ*), to which great interest is attached no less on account of the extraordinary shape of its body than of its internal organization, which is unmistakably that of a deep-sea fish. As in the other members of this family, the body is much elongated and compressed, sword-shaped; but in the oar-fish this character is excessive, the length of the body being about fifteen times its depth. The head likewise is compressed, short, resembling in its form that of a herring; the eye is large, the mouth is small, and provided with very feeble teeth. A long many-rayed dorsal fin, of which the very long anterior rays form a kind of high crest, extends from the top of the head to the end of the tail; the anal and perhaps the caudal fins are absent; but the ventrals (and by this the oar-fish is distinguished from the other ribbon-fishes) are developed into a pair of long filaments, which terminate in a paddle-shaped extremity, but are too flexible to assist in locomotion. The whole body is covered with a layer of silvery epidermoid substance, which easily comes off and adheres to other objects.

Oar-fishes are the largest deep-sea fishes known, the majority of the specimens observed measuring twelve feet in length; but some are recorded to have exceeded twenty feet. Their range in the great depths of the ocean seems to extend over all seas, from the North Sea to the South Atlantic, from Mauritius and Japan to the coast of New Zealand.

OASES. Throughout the great belt of desert extending from the west coast of Africa to central Asia, various fertile tracts occur, clothed with vegetation and watered by springs, to which the name oases has been applied. Those which are best known are met with in the central and eastern portions of the Great Sahara and in the Libyan Desert. In that region they consist generally of deep depressions or valleys, locally termed "wâdis," where the water comes to the surface in natural springs, or where it may be procured by sinking wells. Under the influence of these beneficent springs vegetation bursts forth and covers a more or less extensive area, which becomes a halting place for travelers in the desert, and frequently supports a considerable population. Many of the oases are situated in the mountainous regions, where the ground is sufficiently elevated to precipitate the moisture in the atmosphere. The rain which falls, however, is rapidly absorbed by the rocks or sandy soil, and much of it collects in depressions at no great depth from the surface. The Arabs have long been in the habit of tapping these subterranean waters by sinking wells, a copious supply being usually obtained at depths varying down to 200 fathoms. In the Algerian Sahara a large number of artesian wells have been sunk by the French, resulting in the formation of oases, which have to some extent affected the habits of the native tribes by inducing them to become cultivators of these fertile tracts. It is evident, therefore, that, notwithstanding the arid climate which prevails generally throughout the African deserts, a tolerably plentiful supply of water can be obtained by artificial means at various points. The springs, being essential to the very existence of the oases, are naturally guarded with care so as to prevent the sands encroaching on them. Should they cease to flow, the decay of the vegetation rapidly ensues and the oases disappear.

OAT, *Avena sativa*, L., one of about forty species

mostly dispersed through the temperate regions of the Old World. The spikelets form a loose panicle, familiar in the cultivated oat, the flowering glume having its dorsal rib prolonged into an awn, which is in some species twisted and bent near the base.

Besides the use of the straw when cut up and mixed with other food for fodder, the oat grain constitutes an important food for both man and beast. Being cultivated best in comparatively low temperatures, it has long formed the staple food for Scotland, north England, and Derbyshire, as well as for Germany, wherever wheat does not flourish. It is extensively grown in all the northern States of the American Union, and in New England its production largely exceeds that of wheat. Oatmeal is made from the kiln-dried grain from which the husks have been removed; and the form of the food is the well-known "porridge." In Ireland it is mixed with Indian-corn meal and is called "stirabout." Groats or grits are the whole kernel from which the husk is removed. Their use is for gruel, which used to be consumed as an ordinary drink in the seventeenth century at the coffee-houses in London. The meal can be baked into "cake" or biscuit, as the Passover-cake of the Jews; but it cannot be made into loaves in consequence of the great difficulty in rupturing the starch grains, unless the temperature be raised to a considerable height. With regard to the nutritive value of oatmeal, as compared with that of wheat flour, it contains a higher percentage of albuminoids than any other grain, viz., 12.6—that of wheat being 10.8—and less of starch, 58.4, as against 66.3 in wheat. It has rather more sugar, viz., 5.4—wheat having 4.2—and a good deal more fat, viz., 5.6, as against 2.0 in flour. Lastly, salts amount to 3.0 per cent. in oat, but are only 1.7 in wheat. Its nutritive value, therefore, is higher than that of ordinary seconds flour.

OATES, **TITUS**, author of what is known as the "Popish Plot," was born in 1650, the son of an Anabaptist preacher. He took Anglican orders upon leaving the university and officiated in several parishes, but his career was of a character so scandalous and vicious that he was dismissed from the various livings to which he in turn succeeded. Pretending to become a convert to the Roman Catholic faith, he was received into the church and entered the Jesuit College at Valladolid as Brother Ambrose. He was expelled from this institution in 1677, but in October of the same year was admitted to St. Omer, whence he was also expelled.

In June, 1678, by inventing treasonable letters and accounts of preparations for military action, he succeeded in convincing the English people that the pope and the Jesuits were conspiring to massacre the leading Protestants, including Charles II., obtain forcible possession of the kingdom, and establish the Catholic religion. These startling revelations were generally accepted as fact and caused a very pronounced sensation, followed by the execution of many Jesuits and Roman Catholics, for complicity. In October, 1678, Oates, upon being called before the House of Commons, accused the queen before Charles of high-treason, but when the Lords refused to concur with the House, which had voted for the queen's removal from court, the matter was dropped. In 1679 Sir George Wakeman, the queen's physician, was accused of purposing to poison the king, and the queen was named as being concerned in the plot. Wakeman was acquitted of the charge, however, and Oates was proved to have perjured himself in open court. On June 26, 1680, upon Oates' testimony, the duke of York was presented at Westminster as a recusant, and in November the informer gave evidence in the trial of Strafford. The importance of Oates after this rapidly declined, so much

so, that subsequent to the dissolution of 1682, he was no more heard of during Charles' reign, but enjoyed his pension of \$3,000 or \$4,000 in quiet. Prior to the death of Charles, the duke of York recovered \$500,000 damages in a civil action against Oates. While in prison in default of payment of the same, Oates was indicted for perjury, his trial occurring in May, 1685, soon after the accession of James. He was convicted, severely whipped, pilloried, his ears cut off, and imprisoned. He was detained in prison from 1685 to 1689, gaining his liberty upon the flight of James during the latter year. His sentence was afterward annulled, and the matter finally settled by Oates receiving a royal pardon, with a salary of \$1,500 a year. In 1691 he became acquainted with William Fuller, whom he induced to forge another plot. It met with no success, however, and thereafter Oates appears to have lived in retirement. He died July 13, 1705.

OATH. Anglo-Saxon *ādþ*, a word found throughout the Teutonic languages, but without ascertainable etymology. The verb to *swear* is also Old Teutonic; this word, too, is not clear in original meaning, but is in some way connected with the notion of answering—indeed it still forms part of the word *answer*, Anglo-Saxon *and-svarian*; it has been suggested that the swearer answered by word or gesture to a solemn formula or act.

An oath may be defined as an asseveration or promise made under non-human penalty or sanction. Writers, viewing the subject among civilized nations only, have sometimes defined the oath as an appeal to a deity. The prevalence of the river-worship is seen in the extent to which in the old and modern world oaths by rivers are most sacred. The natural transition from swearing by these great objects of nature to invoking gods conceived in human form is well shown in the treaty-oath between the Macedonians and the Carthaginians recorded by Polybius; here the sun and moon and earth, the rivers and meadows and waters, are invoked side by side with Zeus and Hera and Apollo, and the gods of the Carthaginians. The heaven-god, able to smite the perjurer with his lightning, was invoked by the Romans. As a general rule, however, the supernatural retribution on perjury has been transferred from the present world to the regions beyond the grave, as is evident from any collection of customary oaths.

The forms of oath belonging to all nations and ages, various as they are in detail, come under a few general heads. The Hebrew practice of putting the hand under another's thigh is usually reckoned among oath-rites. Even the covenant among many ancient and modern nations by the parties mixing their blood or drinking one another's is in itself only a solemn rite of union, not an oath proper. Oaths by weapons lasted into the Christian period. Stretching forth the hand toward the object or deity sworn by is a natural gesture. Agamemnon, with uplifted hands, takes Heaven to witness with Sun and Earth and the Erinnyes who below the earth wreak vengeance on the perjurer. The gesture of lifting the hand toward heaven was also an Israelite form of oath. The gesture established itself in Christendom, and has continued to modern times. In England, for example, in the parliament at Shrewsbury in 1398, when the Lords took an oath on the cross at Canterbury never to suffer the transactions of that parliament to be changed, the members of the Commons held up their hands to signify their taking upon themselves the same oath. In France a juror takes oath by raising his hand, saying, "Je jure!" The Scottish judicial oath is taken by the witness holding up his right hand uncovered, and repeating after the

usher, "I swear by Almighty God, and as I shall answer to God at the great day of judgment, that I will," etc. In the ancient world sacrifice often formed part of the ceremony of the oath; typical examples may be found in the Homeric poems, as in Agamemnon's oath already mentioned, or the compact between the Greeks and Trojans, where wine is poured out in libation, with prayer to Zeus and the immortal gods that the perjurer's brains shall, like the wine, be poured on the ground; that the rite thus passes into a symbolic curse-oath of the ordinary barbaric type. Connected with such sacrificial oaths is the practice of laying the hand on the victim or the altar, or touching the image of the god.

The history of oaths in the early Christian ages opens a controversy which to this day has not been closed. Under Christ's injunction, "Swear not at all," many Christians seem at first to have shrunk from taking oaths, and, though after a time the usual customs of judicial and even colloquial oaths came to prevail among them, the writings of the Fathers show efforts to resist the practice. Chrysostom perhaps goes farthest in inveighing against this "snare of Satan." The line mostly taken by influential teachers, however, was that swearing should indeed be avoided as much as possible from its leading to perjury, but that the passages forbidding it only applied to superfluous or trifling oaths, or those sworn by created objects, such as heaven or earth or one's own head. On the other hand, they argued that judicial and other serious swearing could not have been forbidden, seeing that Paul in his epistles repeatedly introduces oaths. This argument is the more forcible from Paul's expressions being actually oaths in accepted forms, and it has also been fairly adduced that Christ, by answering to the adjuration of the high priest, took the judicial oath in solemn form. Among the curiosities of the subject are quaint oaths of kings and other great personages; William Rufus swore "by that and that," William the Conqueror "by the splendor of God," John "by God's teeth;" other phrases are given in Ducange, as "per omnes gentes," "per coronam," "par la sainte figure de Dieu," "par la mort Dieu," etc.

Profane swearing, the trifling or colloquial use of sacred oaths, is not without historical interest, formulas used being apt to keep up traces of old manners and extinct religions. Thus the early Christians were reproved for continuing to say "*mehercle!*" some of them not knowing that they were swearing by Hercules. Oaths by deities of pre-Christian Europe lasted into the modern world, as when a few generations ago Swedish peasants might be heard to swear, "Odin take me if it is not true!" The thunder-god holds his place still in vulgar German exclamations, such as "Donner!" The affected revival of classical deities in Italy in the Middle Ages still lingers in such forms as "per Bacco!" "cospetto di Bacco!" (by Bacchus! face of Bacchus!) In France the concluding oath of the last paragraph has dwindled into "mordieu!" or "morbleu!" much as in England the old oaths by God's body and wounds became converted into "oddsbodikins!" and "zounds!"

The oaths now administered among civilized nations are chiefly intended for maintaining governments and securing the performance of public business. They fall under the headings of political, ecclesiastical, and legal.

OBADIAH is a name pretty frequent in the Old Testament, meaning "servant" or worshiper "of Jehovah." It is synonymous with Abdi and Abdeei, and of a type common in Semitic proper names. The name of Obadiah is prefixed to the fourth and shortest book of the minor prophets, and as no date or other

historical note is added it is not surprising that an early Hebrew tradition recorded by Jerome identified the prophet with the best known Obadiah of the historical books, the protector of the prophets in the reign of Ahab. His tomb was shown in Samaria with those of Elisha and John the Baptist, and the *Epitaphium Paulæ* describes the wild performances, analogous to those of modern dervishes, that took place before these shrines.

OBAN, a seaport town and parliamentary burgh of the Western Highlands of Scotland, is situated in Argyllshire. Population (1890), 4,500.

OBELISK. See ALEXANDRIA, ARCHITECTURE, and EGYPT. The obelisk known as "Cleopatra's Needle," having been offered to the English Government by Mehemet Ali, but declined, was brought to London, and placed on the Thames Embankment in 1878. A similar one was conveyed to the United States and erected in Central Park, New York, in 1880.

OBERAMMERGAU, a small village in the mountain valley of the Ammer, in Upper Bavaria, lies 2,760 feet above the sea, and about 45 miles to the southwest of Munich. In 1880 it contained 1,349 inhabitants, who were mainly engaged in making toys and in carving crucifixes, images of saints, and rosaries. Many of the houses are adorned with quaint frescoes of Biblical subjects. The interest of Oberammergau to the outer world is derived from the Passion Plays which are performed here by the villagers at intervals of ten years (the last in 1880), and are now attended by many thousands of European and American visitors.

OBERHAUSEN, a Prussian town of recent origin, in the province of the Rhine, is situated five miles from the east bank of that river and twenty miles to the north of Düsseldorf. Its importance is due to the fact of its being one of the busiest railway junctions in Germany, and to the extensive coal-pits in the vicinity. The town also possesses ironworks, rolling-mills, zinc smelting-works, railway workshops, and manufactures of wire rope, glass, porcelain, and soap. The annual export of coals is estimated at about 700,000 tons. The first houses of Oberhausen were built in 1845, and it received its municipal charter in 1875. It contains 16,680 inhabitants, of whom 12,079 are Roman Catholics.

OBERLIN, a village in Lorain county, Ohio, thirty-five miles west-southwest of Cleveland by the Lake Shore and Michigan Southern Railway, has a population of 4,330, and is well known as the seat of Oberlin College. This institution for liberal education, open to all irrespective of sex or color, was founded in 1833 by the Rev. John J. Shipherd and Philo P. Stewart, and named in honor of J. F. Oberlin. In 1883 nine distinct buildings were occupied by the various sections; the total number of teachers was 73 and of pupils 1,474 (698 males, 776 females; 78 colored), and the library contained 20,000 volumes.

OBERLIN, JEAN FREDERIC, pastor and philanthropist, was the son of a teacher, and was born August 31, 1740, at Strasburg, where he studied theology. In 1766 he became Protestant pastor of Waldbach, a remote and poverty-stricken region in the Steinthal (Ban de la Roche), in Alsace. He died June 1, 1826, and was interred with great manifestations of honor and affection at the village of Fouday. Since his death the Steinthal has suffered no interruption to its prosperity. When he began his labors its inhabitants did not number more than 500; in the beginning of the century they had increased to about 3,000; and now they are supposed to number about 6,000.

OBERLIN, JÉRÉMIE, archæologist, brother of Jean Frédéric Oberlin noticed above, was born at Strasburg, August 8, 1735, and died in 1806.

OBERON (Auberon, Alberon), king of the fairies, husband of Titania, first appears in literature as protector of the hero in *Huon de Bordeaux*, a *chanson de geste*, dating from about the twelfth century. The name corresponds to the German Alberich or Elferich (elf-king). The fairy element in the legend of Huon has been treated in modern times by Wieland in the poem, and by Weber in the opera of *Oberon*; and the story of the elf-king's quarrel with Titania, as everyone knows, supplies an important *motif* in Shakespeare's *Midsummer Night's Dream*.

OBESITY. See CORPULENCE.

OBI. See SIBERIA.

OBLIGATION, in law, is a term derived from the Roman law, in which *obligatio* signified a tie of law (*vinculum juris*) whereby one person is bound to perform or forbear some act for another. The *obligatio* of Roman law arose either from voluntary acts or from circumstances to which legal consequences were annexed.

The term obligation is important in America from its use in Art. i., S. 10 of the constitution of the United States, "No State shall pass any law * * * impairing the obligation of contracts." This does not affect the power of Congress to pass such a law. Contracts between private individuals are of course within the provision. So are private conveyances, charters of private corporations, and statutory and other grants by a State. On the other hand, marriage and divorce, and arrangements which are political in their nature, such as charters of municipal corporations, licenses to carry on particular trades, or regulations of police, are not within the provision. In order to fall within it, the law must act upon the terms of the agreement, and not merely upon the mode of procedure. If it act not upon the terms but upon the remedy, it impairs the obligation if it purport to be retrospective, but it is valid so far as it applies to subsequent contracts.

OBOE, or HAUTBOY. The oboe is an instrument containing a conical column of air, which is set in vibration by means of a double-tongued reed. A series of holes pierced in the side of the pipe permits the instrumentalist to progressively shorten the column by the successive opening of the lateral holes, and thus produce a series of fundamental sounds, the scale of which, in the primitive instruments without keys, does not exceed the extent of an octave. All instruments with a conical column of air, whatever may be the mode by which that is set in motion, are subject to the laws of vibration of open pipes, according to which, by a stronger pressure in blowing, the oboe reproduces each of its fundamental sounds in the octave higher, and thus acquires a scale of two octaves, which, partially chromatic in the old instruments, has become completely chromatic by the adoption of keys. This extension of compass is further augmented in modern instruments, in the grave sounds by keys permitting lengthenings of the primitive column of air, and in the acute by the employment of other partial sounds than the first of the harmonic series.

O'BRIEN, WILLIAM SMITH, the head of the "Young Ireland" party, was born on October 17, 1803, and received his education at Harrow and at Cambridge. He entered Parliament in 1826 as member for Ennis, and from 1835 to 1848 represented the county of Limerick. Although he spoke in 1828 in favor of Catholic emancipation, he for many years continued to differ on other points from the general policy of O'Connell. He, however, opposed the Irish Arms Act of 1843, and in January, 1844, became an active member of the Repeal Association. Though he was destitute of oratorical gifts, his chivalrous devotion to the welfare of his country secured him enthusiastic attachment as a popular leader. In July, 1846, he with the "Young Ireland" party left

the Repeal Association, and in the beginning of 1847 he established the Irish Confederation. The French Revolution of 1848 stimulated his hopes of success, and incited him to more extreme efforts against the English rule. In May, 1848, he was tried at Dublin for sedition, but the jury disagreed. In the following July he established a war directory, and attempted to make a rising among the peasantry of Ballingarry, but although he was at first joined by a large following the movement wanted cohesion, and the vacillating crowd dispersed as soon as news reached them of the approach of the dragoons. O'Brien was arrested at Thurles, tried, and sentenced to death. The sentence was commuted to transportation for life. In July, 1854, he received his liberty on condition of never revisiting the United Kingdom; and in May, 1856, he obtained a full pardon. Henceforth he kept aloof from all political movements. In 1856 he published *Principles of Government, or Meditations in Exile*. He died at Bangor, North Wales, June 18, 1864.

OBSERVATORY. Up to a comparatively recent date an "observatory" was a place exclusively devoted to the taking of astronomical observations, although frequently a rough account of the weather was kept. When the progress of terrestrial magnetism and meteorology began to make regular observations necessary, the duty of taking these was often thrown on astronomical observatories, although in some cases separate institutions were created for the purpose. Of late years, as the work to be done in astronomical observatories is increasing there seems to be a general tendency to have the magnetical and meteorological observations taken in separate establishments; but, as the exclusively magnetical or meteorological observatories now existing are generally very small institutions and of recent creation, the astronomical observatories will be chiefly considered in this article.

Up to about 300 B.C., it can scarcely be said that an observatory existed anywhere, as the crude observations of the heavens then taken were only made by individuals and at intervals, employing the simplest possible apparatuses. The first observatory was founded at Alexandria, and continued in activity for about 400 years, or until the middle or end of the second century of the Christian era. It was here that Hipparchus, founder of modern astronomy, discovered the precession of the equinoxes, and investigated with considerable success the motions of the sun, moon, and planets. His work was continued by more or less distinguished astronomers, until Ptolemy (in the second century A.D.) gave the astronomy of Alexandria its final development. When science again began to be cultivated after the dark ages, we find several observatories founded by Arabian princes, first one at Bagdad (and possibly one at Damascus), built by the caliph Al-Mamún early in the ninth century, then one on the Mokattam near Cairo, built for Ibn Yúnis by the caliph Hákim (about 1000 A.D.), where the Hákimite tables of the sun, moon, and planets were constructed. The Mongol khans followed the example; thus arose the splendid observatory at Merágha in the northwest of Persia, founded about 1260 A.D., by Hulagu Khan, where Násir al-dín Túsi constructed the Ilohkhanic tables; and in the fifteenth century the observatory at Samarkand was founded by Ulug Begh, and served not only in the construction of new planetary tables but also in the formation of a new catalogue of stars.

With the commencement of scientific studies in Europe

in the fifteenth century the necessity of astronomical observations became at once felt. The first observatory in Europe was erected at Nuremberg in 1472, by a wealthy citizen, Bernhard Walther, who for some years enjoyed the coöperation of the celebrated astronomer Regiomontanus. At this observatory, where the work was continued till the founder's death in 1504, many new methods of observing were invented, so that the revival of practical astronomy may be dated from its foundation. The two celebrated observatories of the sixteenth century, Tycho Brahe's on the Danish island of Huen (in activity from 1576 to 1597) and that of Landgrave William IV. at Cassel (1561-97), made a complete revolution in the art of observing. The impulse which Tycho Brahe gave to practical astronomy at last installed this science at the universities, among which those of Leyden and Copenhagen were the first to found observatories. The foundation of the royal observatories at Paris and Greenwich and of numerous university observatories shows how rapidly the importance of observations had become recognized by governments and public bodies, and it is not until within the last hundred years that the development of various new branches of astronomy has enabled private observers to compete with public institutions.

The instruments employed in observatories have of course changed considerably during the last 200 years. When the first royal observatories were founded, the principal instruments were the mural quadrant for measuring meridian zenith distances of stars, and the sextant for measuring distances of stars *inter se*. These instruments were introduced by Tycho Brahe, but were subsequently much improved by the addition of telescopes and micrometers. When the law of gravitation was discovered it became necessary to test the correctness of the theoretical conclusions drawn from it as to the motions within the solar system, and this necessarily added to the importance of observations. By degrees, as theory progressed, the instruments had to be improved. The transit instrument superseded the sextant; the clocks and chronometers were greatly improved; and lastly astronomers began early in the nineteenth century to treat their instruments, not as faultless apparatuses but as imperfect ones, whose errors of construction had to be detected, studied, and taken into account before the results of observations could be used to test the theory. This century has also witnessed the combination of the transit instrument and the mural quadrant or circle in one instrument—the transit or meridian circle.

Subjoined is a catalogue of the observatories in the United States Mexico and South America:

UNITED STATES.

Albany (New York), Dudley Observatory, lat. $+ 42^{\circ} 39' 49'' \cdot 5$, long. $4^{\text{h}} 54^{\text{m}} 59^{\text{s}} \cdot 2$ W. Erected in 1851-56 by subscription; equatorial refractor by Fitz of 13-inches aperture, meridian circle by Pistor and Martins of 8-inches aperture, now used for observing stars between $+ 1^{\circ}$ and $+ 5^{\circ}$ decl.

Allegheny (Pennsylvania), lat. $+ 40^{\circ} 27' 41'' \cdot 6$, long. $5^{\text{h}} 20^{\text{m}} 28^{\text{s}} \cdot 9$ W. Founded in 1860 in connection with the university; 13-inch equatorial refractor by Fitz (improved by Clark), mounted in 1867.

Amherst (Massachusetts), lat. $+ 42^{\circ} 22' 15'' \cdot 6$, long. $4^{\text{h}} 50^{\text{m}} 7^{\text{s}} \cdot 3$ W. Founded in 1857 as an annex to the college; $7\frac{1}{4}$ -inch refractor by Clark.

Annapolis (Maryland), lat. $+38^{\circ}58'53''5$, long. $5^h5^m56^s.5$ W. U. S. Naval Academy observatory, used for instruction only; 4-inch meridian circle by Repsold, $7\frac{3}{4}$ -inch refractor by Clark, and smaller instruments.

Ann Arbor (Michigan), lat. $+42^{\circ}16'48''0$, long. $5^h34^m55^s.2$ W. Belongs to the university of Michigan; erected in 1854; meridian circle by Pistor and Martins of $6\frac{1}{2}$ -inches aperture, $12\frac{1}{2}$ -inch equatorial refractor by Fitz. The observatory is known by the works of the successive directors, Brünnow and Watson; the latter discovered twenty-one minor planets heré.

Cambridge (Massachusetts), Harvard College observatory, lat. $+42^{\circ}22'48''3$, long. $4^h44^m31^s.0$ W. Erected in 1839. Equatorial refractor of 15-inches aperture by Merz, with which W. C. Bond discovered a satellite of Saturn (Hyperion) in 1848, and which was afterwards used by G. P. Bond to observe the nebula of Orion—it is now employed by Pickering for extensive photometric observations of fixed stars and satellites; a meridian circle by Troughton and Simms with $8\frac{1}{4}$ -inches aperture, mounted in 1870, used for observations of standard stars and stars between $+50^{\circ}$ and $+55^{\circ}$ decl. The *Annals* of the observatory (13 vols. 4to) form one of the most important collections of astronomical researches. Since 1877 the means of the institution have been increased by public subscription, and a large staff of assistants has since been actively employed on photometric and meridian work.

Chicago (Illinois), Dearborn Observatory, lat. $+41^{\circ}50'1''0$, long. $5^h50^m26^s.8$ W. Attached to the university; founded by subscription in 1862. The principal instrument is an $18\frac{1}{2}$ -inch equatorial refractor by Clark (mounted in 1864, but not used till 1877), with which Burnham has continued his observations and discoveries of double stars, commenced with a 6-inch refractor. There is also a 6-inch meridian circle by Repsold.

Cincinnati (Ohio), lat. $+39^{\circ}6'26''5$, long. $5^h57^m58^s.9$ W. In 1842 an observatory was founded by subscription, and furnished with an equatorial refractor of $11\frac{1}{4}$ -inches aperture by Merz. In 1873 the observatory was removed to a distance from the city, to Mount Lookout, lat. $+39^{\circ}8'35''5$, long. $5^h37^m41^s.4$ W. The refractor has been almost exclusively devoted to observations of double stars (*Publications of the Cincinnati Observatory*, 5 parts, 8vo).

Clinton (New York), Litchfield Observatory of Hamilton College, lat. $+43^{\circ}3'17''0$, long. $5^h1^m37^s.4$ W. Erected by subscription, 1852–55; equatorial refractor of $13\frac{1}{2}$ inches by Spencer, employed by C. H. F. Peters for construction of celestial charts (Nos. 1–20 published in 1882), in the course of which work he has discovered forty-one minor planets.

Georgetown (District of Columbia), college observatory, lat. $+38^{\circ}54'26''2$, long. $5^h8^m18^s.3$ W. Erected in 1844; 6-inch refractor and small meridian circle, both by Simms.

Glasgow (Missouri), Morrison Observatory, lat. $+39^{\circ}16'16''8$, long. $6^h11^m18^s.0$ W. Founded in 1876; attached to the university; $12\frac{1}{4}$ -inch equatorial refractor by Clark, used for observations of comets, planets, and double stars; meridian circle by Simms, of 6-inches aperture.

Hanover (New Hampshire), Dartmouth College observatory, lat. $+43^{\circ}42'15''$, long. $4^h49^m8^s.0$ W. Founded in 1853; $9\frac{1}{4}$ -inch equatorial by Clark, used by C. A. Young (up to 1878) for spectroscopic observations of the sun; meridian circle by Simms of 4-inches aperture.

Hastings (New York), Prof. Henry Draper's ob-

servatory, lat. $+40^{\circ}59'25''$, long. $4^h55^m29^s.7$ W. Built in 1860; 28-inch reflector by the owner, 11-inch refractor (with photographic lens) by Clark, both used up to the owner's death (1882) for celestial and spectrum photography. The first photograph of the nebula of Orion was taken here in 1880.

Madison (Wisconsin), Washburn Observatory, lat. $+43^{\circ}4'36''7$, long. $5^h57^m37^s.9$ W. Erected at the expense of Governor Washburn in 1878; belongs to the university. Meridian circle by Repsold, of 4.8-inches aperture, $15\frac{1}{2}$ -inch equatorial refractor by Clark, used for observations of nebulae and double stars. *Publications* in 8vo volumes.

Mount Hamilton (California), Lick Observatory of the university of California, lat. $+37^{\circ}21'3''$, long. $8^h6^m26^s.7$ W., about 4,250 feet above sea level. Is being erected in pursuance of the will of the late James Lick, and is to contain a 36-inch refractor by Clark. The suitability of the site was tested in 1879 by Burnham, who observed for some weeks with his 6-inch refractor. A 12-inch refractor and a 5-inch photoheliograph were used for observing the transit of Venus in 1882.

New Haven (Connecticut), Winchester Observatory of Yale College, lat. $+41^{\circ}18'36''5$, long. $4^h51^m42^s.2$ W. An observatory had existed since 1830, possessing among other instruments a 9-inch refractor by Clark and a meridian circle by Ertel. In 1880 a bureau for verifying chronometers and thermometers was established, and in 1881 the observatory was rebuilt, and furnished with a 6-inch heliometer by Repsold, and an 8-inch equatorial refractor by Grubb.

New York, L. M. Rutherford's observatory, lat. $+40^{\circ}43'48''5$, long. $4^h55^m56^s.6$ W. 13-inch refractor by Rutherford and Fitz, used for celestial photography.

Northfield (Minnesota), Carleton College observatory, lat. $+44^{\circ}27'40''8$, long. $6^h12^m35^s.9$ W. Erected in 1878; $8\frac{1}{4}$ -inch refractor by Clark.

Princeton (New Jersey). Attached to the college are two observatories—the “J. C. Green School of Science observatory,” lat. $+40^{\circ}20'57''8$, long. $4^h58^m37^s.6$ W., erected in 1877, and furnished with a $9\frac{1}{2}$ -inch refractor by Clark; and the Halsted observatory, in which a 23-inch refractor by Clark was mounted in 1883.

Rochester (New York), Warner Observatory, lat. $+43^{\circ}8'15''$, long. $5^h11^m20^s.0$ W. Erected by H. H. Warner in 1879–80; has a 16-inch refractor by Clark.

Washington (D. C.), U. S. naval observatory, lat. $+38^{\circ}53'38''8$, long. $5^h8^m12^s.1$ W. Observations were commenced in a temporary observatory in 1838; the naval observatory was organized in 1842; observations commenced in 1845. For some years a large amount of zone observations were taken with three meridian instruments, but as Maury, who held the office of superintendent from 1844 to 1861, devoted himself exclusively to meteorology, the astronomical work was considered of less importance. Since 1861 the observations have again been published in annual 4to volumes, the appendices to which contain many important memoirs by the five astronomers attached to the institution. In addition to these and the superintendent (naval officer) there are three assistants. The instruments are: a mural circle by Troughton and Simms of 4 inches; a transit instrument by Ertel of 5.3-inches aperture; these two instruments have been used to observe a catalogue of 11,000 fixed stars; a 9.6-inch equatorial refractor by Merz, used for observing minor planets and comets; a meridian circle by Pistor and Martins, of 8.5-inches aperture, mounted in 1865, and used for observing standard

stars and planets; a 26-inch equatorial refractor by Clark, mounted in 1873, and use for observations of satellites and difficult double stars—with this instrument Hall discovered the satellites of Mars in 1877. A new observatory is now being built, the former locality being too near the Potomac river.

Williamstown (Massachusetts), lat. $+42^{\circ}42'49''$, long. $4^{\text{h}}52^{\text{m}}33^{\text{s}}.5$ W. Founded in 1836; $7\frac{1}{2}$ -inch refractor by Clark; meridian circle of $4\frac{1}{2}$ -inches aperture by Repsold, mounted in 1882.

MEXICO.

Chapultepec (about 2 miles southwest of Mexico), national observatory, lat. $+19^{\circ}25'17''.5$, long. $6^{\text{h}}36^{\text{m}}38^{\text{s}}.2$ W. Erected in 1877–80; a 15 inch equatorial refractor by Grubb was procured in 1882; there is also an altazimuth by Simms, etc. In 1883 the observatory was moved to Tacubaya.

SOUTH AMERICA.

Santiago (Chili), national observatory, lat. $-33^{\circ}26'42''.0$, long. $4^{\text{h}}42^{\text{m}}42^{\text{s}}.4$ W.

Lima (Peru). In 1866 a meridian circle of 7-inches aperture and a $10\frac{1}{2}$ -inch refractor were procured from Eichens, but we are not aware of any astronomical work having been done at Lima.

Rio de Janeiro (Brazil), imperial observatory, lat. $-22^{\circ}54'23''.8$, long. $2^{\text{h}}52^{\text{m}}41^{\text{s}}.4$ W. Founded in 1845; no work done until 1871. The principal instruments are a meridian circle by Dollond, an altazimuth, a $9\frac{1}{2}$ -inch refractor by Henry, etc. A *Bulletin* was commenced in 1881.

Cordova (Argentine Republic), national observatory, lat. $-31^{\circ}25'15''.4$, long. $4^{\text{h}}16^{\text{m}}45^{\text{s}}.1$ W. Erected in 1871 under the direction of B. A. Gould.

OBSIDIAN, a volcanic glass said to have been named after its discoverer, Obsidius. It is usually of black, brown, or gray color, and in some varieties banded or striated. Due not so much to the vitreous mass itself as to the presence of minute foreign bodies or microlites, which in some cases appear to be incipient crystals of feldspar, while in others they probably consist of such minerals as augite, hornblende, biotite, and magnetite. It is notable that certain kinds of obsidian possess a peculiar metallic sheen, attributed by Professor Zirkel to the presence of minute ovoid inclosures, and not to a porous structure, as had been previously suspected. There can be no doubt that obsidian has been formed by the rapid cooling of a felspathic lava. It is found chiefly in Iceland, the Lipari Islands, Melos and other isles of the Greek archipelago, the Caucasus, Siberia, Mexico, Peru, and New Zealand.

OBSTETRICS is the branch of medical science which treats of pregnancy, parturition (child-bearing), and midwifery. In the older days of the science of medicine this branch of the practice had only to deal with the woman in her actual confinement, and any demand for medical assistance which might occur either before or after the immediate delivery fell to the general practitioner and not to the obstetrician. But in these latter days, in which the science of gynæcology has made such wonderful strides, the care of the pregnant as well as the parturient woman has been more and more confided to the specialist, and with the most beneficial results; for instead of the confused and shadowy notions engendered by the general superstition of the times, together with an entire ignorance of the anatomical correlation of the parts involved, we have now the intimate acquaintance with the functions of each organ, and their bearings on the general result which the extended observation and careful study of modern practitioners alone can give. But even with

our great advance in the general science and in the pathology of women's diseases, there are yet points upon which we are entirely ignorant, and we are fain to confess that we have advanced thus far only to discover how little we know. For instance, what man is there among us who dare assert in the earlier stages, before he can hear the *bruit du souffle*, that a woman is positively pregnant? True, he may by a collation of symptoms have reason to *believe* that the subject is pregnant; yet he cannot assert as a positive fact such a condition of affairs, for there is not one other symptom that may not be produced from totally different causes. And, on the other hand, he cannot assert that a woman *is not* pregnant even in the absence of *all* signs. The one infallible symptom of *positive* value is the foetal heart-beat—only to be heard after the child has “quickened,” or moved in the womb—while the absence of sound upon auscultation is of *no* value whatever as *negative* evidence.

The average duration of pregnancy lies between 280 and 300 days, though this period, from inaccuracy of observation, or from some anomalous phenomena, may *seem* to vary one way or another in some cases. The usual signs of pregnancy in a woman are:—First, the cessation of the menses (at this particular point is one of the most frequent sources of error in determining the duration of a pregnancy; frequently a woman—particularly in *prima para*—will apparently have the monthly flow within the period of nine months precedent to the birth of a *fully developed* child; this appearance is not the catamenial flow, but a hemorrhage which sometimes accompanies conception; yet it has been ignorantly taken as the menstrual flow, with the resulting belief that the child was an “eight-months” babe); the nausea sometimes resulting from the enlargement of the womb and the nervous disturbance dependent thereon, the paroxysms usually coming on in the morning about the hour of rising; the enlargement of the abdomen, perceptible at various periods in different women; the appearance of an areola around the nipples, accompanied by enlargement of the breasts as the pregnancy advances. There are other secondary symptoms in abnormal cases, the appearance of which, while they are undoubtedly concomitant with pregnancy, are yet to be regarded as pathological rather than as symptoms of healthy pregnancy. Some enthusiasts on the subject of physical culture for women have gone so far as to postulate that any uncomfortable or distressing symptom of pregnancy is abnormal and the result of perverted habit rather than a natural consequence or accompaniment of the healthy condition of incipient motherhood. This statement, based on the exhibition of vitality in the women of savage races, whose forms have never been cramped within the deadly embrace of the tight-laced stays or close-fitting corset, is worthy of respectful consideration; but when they go beyond this and declare that pain in labor is abnormal and cite the same examples, we must accept their statements *cum grano salis*, and believe that evidence of pain is not given by the savage woman not because it is not present, but because her stoical training will not allow her to give expression to what she feels. We know that even the lower animals suffer pain in labor. This last proposition of the female culturists is untenable.

But even with all their painful accompaniments, the proportion of natural labors to those requiring surgical interference is overwhelmingly great. Not one labor in a thousand may be said to be abnormal, and in no case is surgical interference justifiable unless there be some malformation either on part of mother or child—the *vis naturæ* being sufficient to accomplish its own deliver-

ance at all times where the conditions mentioned above are not present. The practice of interference by the surgeon—either instrumental or with drugs—cannot be too strongly reprobated, unless, indeed, there appear some insurmountable obstacle or the mother is becoming rapidly exhausted from the duration of the labor. Of course we speak here of normal labor. There are cases, as for example in a foot presentation, when the child's body has appeared to the shoulders, and the umbilical cord has come down; here the surgeon must deliver at once by force if he would save the child; for any delay will result in asphyxia and death of the little one. In other cases the head of the infant in regular presentations is too large to pass the narrow strait; here, too, surgical interference is necessary. Formerly the method employed was either the Cæsarian operation or craniotomy. The former was done by cutting through the abdomen into the womb and delivering the child. Severe as this operation must have been in the days of imperfect surgical knowledge and appliances, we yet have records of the recovery of mothers under the ordeal. In modern surgery the practice, which has become very rare, is divested of the greater portion of its danger where proper sanitary measures are taken. The operation of craniotomy is performed by breaking into and emptying the skull of the foetus of its contents, thus diminishing the size and allowing it to extrude. The soft parts of the body usually offer no resistance to passage from the womb to the external world. Happily for the unborn generations we now have instruments which are every year being brought to greater perfection and obviate this sacrifice of life—either of mother or child. The invention of the forceps was the first great step in this direction, and although at first they were applied excessively—to the detriment of both mother and offspring—yet since an intelligent conservatism in their use has taken possession of the faculty they may be regarded as one of the great blessings which the ingenuity of man has been able to perfect for his own use. But, aside from the actual use of instruments, modern research has placed within the reach of the *accoucheur* drugs which mitigate the severity of labor while at the same time they shorten the period over which its torturing pangs extend.

Such is gelsemium, which assists in the dilatation of the *os uteri*, and is one of a class of many such drugs; such also is ergot, which increases the expulsive power of the womb. Many more might be mentioned, but these are the most commonly used. As a means of hastening labor it is sometimes justifiable to rupture the amnion and evacuate the *liquor amnii*, the result being an increase of the expulsive efforts of the womb; it being a physiological law that the expulsive efforts of the womb increase as the volume of its contents is diminished.

The care of the parturient woman is of the utmost importance, and in no branch of obstetrics has practice more changed than in this. Women not yet grandmothers can recollect when for nine days no change of bed linen or of personal attire was allowed, it being considered specially dangerous to move the woman at all. Small wonder that some died; great wonder that any lived. No matter how hot the weather, for nine days she must lie in a festering mass of corruption, the stench of which would make the stoutest stomach faint and sick. Puerperal fever was escaped only by a miracle. Now, thanks to the prevalence of better sense and better methods, the most absolute cleanliness is essential. Nothing should come in contact with the wounded and lacerated genitals that has not been thoroughly disinfected and sterilized. The administration of vaginal injections of warm water thoroughly

carbolized should be persisted in, giving two or three injections daily, and on the faintest suspicion of that awful deadly stench which precedes puerperal fever, suppositories containing iodoform should be inserted in the vagina and supplied as fast as dissolved until all traces of the odor disappear. The linen of both bed and body must be changed daily or oftener if they become soiled. The temperature of the room must not be kept above 70° Fahr.

Puerperal fever, peritonitis, or by whatsoever name denominated, is the inflammation which sets up as a result of absorption of morbid substances into the circulation, producing septicæmia, from which, in a majority of cases, a rapid death ensues. It is generally considered that the danger of inflammatory action setting up is passed on the tenth day; but on this account there should be no relaxation in the sanitary measures adopted at first. Absolute cleanliness is the first great requisite for an easy confinement; then come prudence of diet, attention to the condition of the bowels, and if necessary (generally needed in malarious regions) administration of tonic or antiperiodic remedies such as quinine. Keep the patient in a quiet, well-ventilated room, see that her breasts are evacuated of milk regularly, assisting nature with a pump if the child be too weak to draw all milk out. By a due observance of these suggestions, in a majority of cases, all trouble will be avoided.

For the scientific treatment of obstetrics the reader is referred to one of the numerous medical textbooks on this subject.

OCCAM, WILLIAM OF, the great English schoolman (*Doctor invincibilis*), was born in the village of Ockham, in the county of Surrey, England, in the end of the thirteenth century. Scarcely any traces of his early life remain. Unattested tradition says that the Franciscans persuaded him while yet a boy to enter their order, sent him to Oxford to Merton College, and to Paris, where he was first the pupil, then the successful rival, of the celebrated John Duns Scotus. The date of his death and the place of his burial are both uncertain. He probably died at Munich in 1349, and was buried in the graveyard of the Franciscan convent.

OCEAN. See SEA.

OCEAN LIFE. Until recent years the belief was general that animal life could not be sustained in the depths of the ocean, owing to a lack of the necessary conditions of food and light. Scientific research, however, has disproved this. Efforts to dredge the ocean's bottom, begun in the last century, were attended with but indifferent results, and it was not until 1819 that revelations of life forms of the deeper ocean were made by Sir John Ross during his first arctic voyage. In 1838 interest began to be manifested in deep-sea dredging, and despite evidences of the existence of a deep-sea fauna up to 1866, it was generally believed that the field below the 300-fathom line was barren of animal life. In the years between the latter date and 1872 expeditions were sent out by the United States and British governments to procure a solution of the question by systematic researches in the waters bordering upon the coasts of the United States, Ireland, and Scotland, as also in the Bay of Biscay. In the waters of the latter animal life was found to exist abundantly at the great depth of 2,400 fathoms.

During December, 1871, and early in the year 1872, the coast-survey steamer *Hassler* conducted a series of deep-sea dredging under the direction of Louis Agassiz, but the most important expedition of this character undertaken was that of the *Challenger*, sent out during the latter year by the British Government. The voyage occupied four years, and the distance traversed was 69,000 miles. The investigations were made in the

waters of the Atlantic and Pacific, and on three occasions the vessel's dredge reached a depth of over 3,000 fathoms, living forms being brought up from this extreme depth. The deepest surroundings made, however, were 4,575 fathoms, and the vessel upon her return, in May, 1876, brought an exceedingly rare collection of specimens.

Since the *Challenger* voyage a number of dredging expeditions have been sent out. Among the most notable were those undertaken by the Norwegians in 1876, 1877, and 1878, also by the Germans, Italians, and French, to the Azores and Saragassa sea, and by the Americans in the region of the West Indies and the Gulf of Mexico. These latter researches were conducted under the scientific direction of Alexander Agassiz, and were fruitful of interesting results. In 1883 the *Albatross*, the best equipped dredger in existence, on her first voyage made a successful trawl in the Atlantic of 2,949 fathoms. She was afterward employed in dredging in the Pacific, off the western coast of America.

OCEANIA. See POLYNESIA.

OCELOT. The smaller spotted or striped species of the genus *Felis*, of both the Old and the New World, are commonly called tiger-cats. Of these, one of the best known and beautifully marked forms, peculiar to the American continent, has received the name of Ocelot (*Felis pardalis*), though zoölogists are still undecided whether under this designation several distinct species have not been included, or whether all the ocelots are to be referred to a single species showing great individual or racial variation. Their fur, a tawny yellow or reddish-gray ground color, is marked with black spots, aggregated in streaks and blotches, or in elongated rings, inclosing an area which is rather darker than the general ground color. They range through the wooded parts of tropical America, from Arkansas in the north as far south as Paraguay, and in their habits resemble the other smaller members of the cat tribe, being ready climbers and exceedingly blood-thirsty.

OCHER. See PIGMENTS.

OCHINO, BERNARDINO, Italian reformer, was born at Siena in 1487. At an early age he entered the order of Observantine Friars, and rose to be its general, but transferred himself, in 1534, to the newly-founded order of Capuchins. He had already become famous for zeal and eloquence, and was the intimate friend of the noble Spaniard Juan de Valdès, of Bembo, Vittoria Colonna, Pietro Martire, Carnesecchi, and others destined to incur the suspicion of heresy. In 1538 he was elected vicar-general of his order; in 1539 he visited Venice and delivered a remarkable course of sermons, showing a decided tendency to the doctrine of justification by faith, which appears still more evidently in his dialogues published the same year. He was suspected and denounced, but nothing ensued until the establishment of the Inquisition in Rome in June, 1542, at the instigation of the austere zealot Caraffa. In 1545 he became minister of the Italian Protestant congregation at Augsburg, which he was compelled to forsake when, in January, 1547, the city was occupied by the imperial forces. He found an asylum in England, where he was made a prebendary of Canterbury, received a pension from Edward VI.'s privy purse, and composed his capital work, the *Tragedy*. This remarkable performance, originally written in Latin, is extant only in the translation of Bishop Ponet. Ochino was banished from Zurich because of his alleged justification of polygamy and divorce, and, after being refused a shelter by other Protestant cities, directed his steps toward Poland, at that time the most tolerant state in

Europe. He had not resided there long when an edict appeared banishing all foreign dissidents. Flying from the country, he encountered the plague at Pinczoff; three of his four children were carried off; and he himself, worn out by misfortune, expired in solitude and obscurity at Schlakau in Moravia, about the end of 1564.

OCKLEY, SIMON, Orientalist, was born at Exeter, England, in 1678, and died in 1720.

O'CONNELL, DANIEL, born August 6, 1775, near Cahirciveen, a small town in Kerry, Ireland, was sprung from a race the heads of which had been Celtic chiefs, had lost their lands in the wars of Ireland, and had felt the full weight of the harsh penal code which long held the Catholic Irish down. Thus he inherited from his earliest years, with certain traditions of birth and high station, a strong dislike of British rule in Ireland and of the dominant owners of the soil, a firm attachment to his proscribed faith, and habitual skill in evading the law; and these influences may be traced in his subsequent career. O'Connell learned the rudiments at a school in Cork, one of the first which the state in those evil days allowed to be opened for Catholic teaching; and a few years afterward he became a student, as was customary with Irish youths of his class, in the colleges of St. Omer and Douai. His great abilities, it is said, were there perceived by the principals, and their peculiar training undoubtedly left a permanent mark on his mind and nature, for the casuistry and the diction of the Romish priesthood distinctly appear in his speeches and writings, and he had much of the ecclesiastic in his manners and bearing. These years, too, in France had, in another way, a decided effect in forming his judgment on political questions of high moment. He was an eye-witness on more than one occasion of the folly and excesses of the French Revolution; and these scenes not only increased his love for his church, but strongly impressed him with that dread of anarchy, of popular movements ending in bloodshed, and of communistic and socialistic views which characterized him in after life. To these experiences, too, we may partly ascribe the reverence for law, for the rights of property, and for the monarchical form of government which he appears to have sincerely felt; and, demagogue as he became in a certain sense, they gave his mind a deep Conservative tinge. In 1798 he was called to the bar of Ireland, and though, as professing a still degraded creed, he was shut out from the chance of promotion, though he could not even obtain a silk gown; and though, what was of more importance, he was subjected in a variety of ways to caste hostility, he rose before long to the very highest eminence among contemporary lawyers and advocates. This position was in the main due to a dexterity in conducting causes, and especially in examining witnesses, in which he had no rival at the Irish bar, and here his profound sagacity, observant cunning, and intuitive knowledge of the native character enabled him to accomplish wonders, even at the present day not wholly forgotten. He was, however, a thorough lawyer besides, inferior in scientific learning to two or three of his most conspicuous rivals, but well read in every department of law, and especially a master in all that relates to criminal and constitutional jurisprudence. As an advocate, too, he stood in the very highest rank; in mere oratory he was surpassed by Plunket, and in rhetorical gifts by Bushe, the only speakers to be named with him in his best days at the Irish bar; but his style, if not of the most perfect kind, and often disfigured by decided faults, was marked by a peculiar subtlety and manly power, and produced great and striking effects. On the whole, in the art of winning over juries he had scarcely an equal in the law courts.

To understand, however, O'Connell's greatness we

must look to the field of Irish politics. From early manhood he had turned his mind to the condition of Ireland and the mass of her people. The worst severities of the penal code had been, in a certain measure, relaxed, but the Catholics were still in a state of vassalage, and they were still pariahs compared with the Protestants. The rebellion of 1798 and the Union had dashed the hopes of the Catholic leaders, and their prospects of success seemed very remote when, in the first years of the present century, the still unknown lawyer took up their cause. Up to this juncture the question had been in the hands of Grattan and other Protestants, and of a small knot of Catholic nobles and prelates; but their efforts had not accomplished much, and they aimed only at a kind of compromise, which, while conceding their principal claims, would have placed their church in subjection to the state. O'Connell inaugurated a different policy, and had soon given the Catholic movement an energy it had not before possessed. Himself a Catholic of birth and genius, unfairly kept back in the race of life, he devoted his heart and soul to the cause, and his character and antecedents made him the champion who ultimately assured its triumph. Having no sympathy with the rule of "the Saxon," he saw clearly how weak was the hold of the government and the Protestant caste on the vast mass of the Catholic nation; having a firm faith in the influence of his church, he perceived that it might be made an instrument of immense political power in Ireland; and, having attained a mastery over the lawyer's craft, he knew how a great popular movement might be so conducted as to elude the law and yet be in the highest degree formidable. With these convictions, he formed the bold design of combining the Irish Catholic millions, under the superintendence of the native priesthood, into a vast league against the existing order of things, and of wresting the concession of the Catholic claims from every opposing party in the state by an agitation, continually kept up, and embracing almost the whole of the people, but maintained within constitutional limits, though menacing and shaking the frame of society. He gradually succeeded in carrying out his purpose; Catholic associations, at first small, but slowly assuming larger proportions, were formed in different parts of the country; attempts of the government and of the local authorities to put them down were skillfully baffled by legal devices of many kinds; and at last, after a conflict of years, all Catholic Ireland was arrayed to a man in an organization of enormous power, that demanded its rights with no uncertain voice. O'Connell, having long before attained an undisputed and easy ascendancy, stood at the head of this great national movement; but it will be observed that, having been controlled from first to last by himself and the priesthood, it had little in common with the mob rule and violence which he had never ceased to regard with aversion. His election for Clare, in 1828, proved the forerunner of the inevitable change, and the Catholic claims were granted the next year, to the intense regret of the Protestant Irish, by a government avowedly hostile to the last, but unable to withstand the overwhelming pressure of a people united to insist on justice. The result, unquestionably, was almost wholly due to the energy and genius of a single man, though the Catholic question would have been settled, in all probability, in the course of time; and it must be added that O'Connell's triumph, which showed what agitation could effect in Ireland, was far from doing his country unmixed good.

O'Connell joined the Whigs on entering parliament, and gave effective aid to the cause of reform. The agitation, however, on the Catholic question had quickened the sense of the wrongs of Ireland, and the Irish

Catholics were engaged ere long in a crusade against tithes and the established church, the most offensive symbols of their inferiority in the state. It may be questioned whether O'Connell was not rather led than a leader in this; the movement, at least, passed beyond his control, and the country for many months was terrorized by scenes of appalling crime and bloodshed. Lord Grey, very properly, proposed measures of repression to put this anarchy down, and O'Connell opposed them with extreme vehemence, a seeming departure from his avowed principles, but natural in the case of a popular tribune. This caused a breach between him and the Whigs; but he gradually returned to his allegiance to them when they practically abolished Irish tithes, cut down the revenues of the established church, and endeavored to secularize the surplus. By this time O'Connell had attained a position of great eminence in the House of Commons; as a debater he stood in the very first rank, though he had entered St. Stephen's after fifty; and his oratory, massive and strong in argument, although too often scurrilous and coarse, and marred by a bearing in which cringing flattery and rude bullying were strangely blended, made a powerful, if not a pleasing, impression. O'Connell steadily supported Lord Melbourne's government, gave it valuable aid in its general measures, and repeatedly expressed his cordial approval of its policy in advancing Irish Catholics to places of trust and power in the state, though he personally refused a high judicial office. Though a strict adherent of the creed of Rome, he was a Liberal, nay a Radical, as regards measures for the vindication of human liberty, and he sincerely advocated the rights of conscience, the emancipation of the slave, and freedom of trade. But his rooted aversion to the democratic theories imported from France, which were gradually winning their way into England, only grew stronger with advancing age; he denounced Chartism in unmeasured terms; the sovereign had no more loyal subject; and if, as became him, he often condemned the tyranny of bad Continental governments, he revered the constitution and laws of England interpreted in a generous spirit. His conservatism, however, was most apparent in his antipathy to socialistic doctrines and his tenacious regard for the claims of property. He actually opposed the Irish Poor Law, as encouraging a communistic spirit; he declared a movement against rent a crime; and, though he had a strong sympathy with the Irish peasant, and advocated a reform of his precarious tenure, it is difficult to imagine that he could have approved the cardinal principle of the Irish Land Act, the judicial adjustment of rent by the state.

O'Connell changed his policy as regards Ireland when Peel became minister in 1841. He declared that a Tory régime in his country was incompatible with good government, and he began an agitation for the repeal of the Union. One of his motives in taking this course no doubt was a strong personal dislike of Peel, with whom he had often been in collision, and who had singled him out in 1829 for what must be called a marked affront. O'Connell, nevertheless, was sincere and even consistent in his conduct; he had denounced the Union in early manhood as an obstacle to the Catholic cause; he had spoken against the measure in parliament; he believed that the claims of Ireland were set aside or slighted in what he deemed an alien assembly; and, though he had ceased for some years to demand repeal, and regarded it as rather a means than an end, he was throughout life an avowed repealer. It should be observed, however, that in his judgment the repeal of the Union would not weaken the real bond between Great Britain and Ireland; and he had nothing in common with the rebellious fac-

tion who at a later period openly declared for the separation of the two countries by force. The organization which had effected such marvelous results in 1828-29 was recreated for the new project. Enormous meetings, convened by the priesthood, and directed or controlled by O'Connell, assembled in 1842-43, and probably nine-tenths of the Irish Catholics were unanimous in the cry for repeal. O'Connell seems to have thought success certain; but he had not perceived the essential difference between his earlier agitation and this. The enlightened opinion of the three kingdoms for the most part approved the Catholic claims, and as certainly it condemned repeal. After some hesitation Peel resolved to put down the repeal movement. A vast intended meeting was proclaimed unlawful, and O'Connell was arrested and held to bail, with ten or twelve of his principal followers. He was convicted after the trials that followed, but they were not good specimens of equal justice, and the sentence was reversed by the House of Lords, with the approbation of competent judges. The spell, however, of O'Connell's power had vanished; his health had suffered much from a short confinement; he was verging upon his seventieth year; and he was alarmed and pained by the growth of a party in the repeal ranks who scoffed at his views, and advocated the revolutionary doctrines which he had always feared and abhorred. Before long famine had fallen on the land, and under this visitation the repeal movement, already paralyzed, wholly collapsed. O'Connell died soon afterward, on May 15, 1847, at Genoa, while on his way to Rome, profoundly afflicted by his country's misery, and by the failure of his late high hopes, yet soothed in dying by sincere sympathy, felt throughout Ireland and largely in Europe, and expressed even by political foes. He was a remarkable man in every sense of the word. O'Connell married, in 1802, his cousin, Mary O'Connell, by whom he had three daughters and four sons. Of the latter, all have at one time or another had seats in parliament.

O'CONNOR, FEARGUS EDWARD, Chartist leader, was born in 1796, and entered parliament as member for the county of Cork in 1832. Though a zealous supporter of repeal, he endeavored to supplant O'Connell as the leader of the party, an attempt which aroused against him the popular antipathy of the Irish. When, therefore, in 1834, he was unseated on petition, he resolved to go to England, where he established the *Northern Star* newspaper, and became a vehement advocate of the Chartist movement. In 1847 he was returned for Nottingham, and in 1848 he presided at a Chartist demonstration in London, which caused great alarm. See CHARTISM. The eccentricity and extravagance which characterized his opinions from the beginning of his career gradually became more marked until they developed into insanity. In 1853 he was found to be of unsound mind by a commission of lunacy. He died at London August 30, 1855.

OCONTO, the capital of the county and township of the same name in Wisconsin, is situated on the west shore of Green Bay, at the mouth of the Oconto river and twenty-eight miles north of the city of Green Bay. The principal business is the export of lumber and the water-power operates a large number of saw-mills. Population, 6,000.

OCTAVIA. (1.) Octavia, daughter of Caius Octavius, prætor, 61 B.C., and sister of the emperor Augustus, was married to C. Marcellus, one of the bitterest enemies of Julius Cæsar. In 41 her husband died, and she was married immediately to Antony, with the design of securing peace between her brother and her new husband. Her beauty and her high character are praised in the warmest terms by all authorities, and at first Antony devoted himself to her, and seemed to

have forgotten his jealousy of her brother and his old love for Cleopatra. But his affection for his wife was not strong enough to counterbalance the feelings that weighed against it. In the year 36 he went off to the Parthian war and to meet Cleopatra, and, when in the following year Octavia brought out troops and money to him, he refused to see her and bade her go back to Rome. She sent the money to him and returned to his house, where she educated his son by a former wife along with her own children. In 32 Antony formally divorced her, but she always protected his children, even those of Cleopatra. She died 11 B.C., and was buried with the highest honors by the state. (2.) Octavia, daughter of the emperor Claudius, was married in her twelfth year to NERO, (q.v.) A Latin tragedy on her fate is attributed, though wrongly, to Seneca.

OCTOBER, the eighth month of the old Roman year, which began in spring. By the Julian arrangement, while retaining its old name, it became the tenth month, and had thirty-one days assigned to it. The meditrinalia, when a libation of new wine was made in honor of Meditrina, were celebrated on the 11th, the faunalia on the 13th, and the equiria, when the "equus October" was sacrificed to Mars in the Campus Martius, on the 15th. It corresponds partly to the Vendémiaire and partly to the Brumaire of the first French republic.

OCTOPUS. See CUTTLEFISH and MOLLUSCA.

OCYDROME, a word formed from *Ocydromus*, meaning "swift-runner," and suggested by Wagler in 1830 as a generic term for a New Zealand bird called in the then unpublished manuscripts of the elder Forster *Rallus troglodytes*, and so designated in 1788 by Gmelin, who knew of it through Latham's English description.

The chief interest attached to the Ocydromes is their inability to use in flight their wings with which they are furnished, and hence an extreme probability of the form becoming wholly extinct in a short time. Of this inability there are other instances among the *Rallidæ* (see MOORHEN), but here we have coupled with it the curious fact that in the skeleton the angle which the scapula makes with the coracoid is greater than a right angle, a peculiarity shared only, so far as is known, among the *Carinata* by the Dodo. The Ocydromes are birds of dull plumage, and mostly of retiring habits.

ODDFELLOWS, a name adopted by the members of certain social institutions having mystic signs of recognition, initiatory rites and ceremonies, and various grades of dignity and honor. The objects the associations have in view are purely social and benevolent; the sphere of their operations is confined wholly to their own members, and secrecy is enjoined in regard to all benevolent acts. As in the case of most other institutions of a similar kind, a claim of venerable antiquity has been set up for the order of Oddfellows, but Oddfellows themselves now generally admit that the institution cannot be traced to an earlier period than the first half of the eighteenth century, and the oldest lodge of which the name has been handed down to us is the Loyal Aristarcus, No. 9, which met in 1745 "at the Oakley Arms, Borough of Southwark; Globe Tavern, Hatton Garden; or the Boar's Head in Smithfield, as the noble master may direct." The earliest lodges were supported by each member and visitor paying a penny to the secretary on entering the lodge, and special sums were voted to any brother in need. If out of work he was supplied with a card and funds to reach the next lodge, and he went from lodge to lodge until he found employment. Now there is a regular system of periodical dues and collections, with occasional fees proportioned to the dignities or degrees conferred in the lodges.

Oddfellowship was introduced into the United States

from the Manchester Unity in 1819, and the grand lodge of Maryland and the United States was constituted February 22, 1821. At first the progress of the order was slow, but its principles spread with great rapidity, and it now rivals in membership and influence the Manchester Unity, from which it severed its connection in 1842. In 1843 it issued a dispensation for opening the Prince of Wales Lodge, No. 1, at Montreal, Canada. The American society, including Canada and the United States, has its headquarters at Baltimore. In 1882 the membership was said to be 500,000, the income \$6,000,000, and the annual sum disbursed for the relief of members of the order \$2,000,000. Within the past decade the progress of the order has been both rapid and substantial. Its membership has been steadily increased in number, and its influence and importance grown in volume and value.

ODENATHUS, or ODÆNATHUS, prince of Palmyra. See PALMYRA and PERSIA.

ODENSE, a city of Denmark, the chief town of the province of the same name, forming the northern part of the island of Fünen (Fyen), lies about four miles from Odense Fjord on the Odense Aa, the main portion on the north side of the stream and the modern Albani quarter on the south side. It is a station on the railway route between Copenhagen and western Denmark, and a ship canal ten feet deep constructed in 1796-1804 affords direct communication with the sea. As an industrial town Odense has made great progress since the middle of the century; besides a large number of breweries and distilleries, it contains glove-factories, matchworks, mineral-water works, tobacco-factories, chemical works, etc. The population was 5,782 in 1801, 11,122 in 1850, 16,970 in 1870, 20,804 in 1880, and about 30,000 in 1890.

ODER, one of the principal rivers of Germany, rises on the Odergebirge, in the Moravian tableland, at a height of 1,950 feet above the sea, and fourteen miles to the east of Olmütz. It is 550 miles long from its source to its mouth in the Baltic Sea, and drains an area of about 50,000 square miles. The first forty-five miles of its course lie within Moravia; for the next fifteen it forms the frontier between Prussian and Austrian Silesia; while the remaining 490 miles belong to Prussia, where it traverses the provinces of Silesia, Brandenburg, and Pomerania. As far as the frontier the Oder flows through a well-defined valley, but, after passing through the gap between the Moravian mountains and the Carpathians and entering the Silesian plain, its valley is wide and shallow and its banks generally low. In its lower course it is divided into numerous branches, forming a large quantity of islands. The most important towns on its banks are Ratibor, Oppeln, Brieg, Breslau, Glogau, Frankfort, Cüstrin, and Stettin, with the seaport of Swinemünde at its mouth. Glogau and Cüstrin are strongly fortified, and Swinemünde is also defended by a few forts.

ODESSA, one of the most important seaports of Russia, ranks in the empire by its population (225,000) and foreign trade after St. Petersburg, Moscow, and Warsaw. It is situated on the southern shore of a semicircular bay, at the northwestern angle of the Black Sea, and is 933 miles distant from Moscow and 403 miles from Kieff. The bay of Odessa, which has an area of fourteen square miles and a depth of thirty feet, with a soft bottom, is a dangerous anchorage on account of its exposure to easterly winds. The ships lie, therefore, in two harbors, both protected by moles—the "quarantine harbor," from four to twenty-one feet deep, and the so-called "practical harbor," for coasting-vessels, with a maximum depth of eleven feet. A new one, 1,100 yards long and 660 yards wide, was con-

structed a few years ago. Odessa experiences the influence of the continental climate of the neighboring steppes; its winters are cold, its summers are hot, and the yearly average temperature is 48.5°. The rainfall is scanty, and one of the plagues of the city is the chalky dust, which is raised in clouds by the strong winds to which it is exposed.

Odessa is the real capital, intellectual and commercial, of the so-called Novorossia, which includes the governments of Bessarabia and Kherson. In the official subdivision of Russia it is only the chief town of the district of the same name in the government of Kherson. Odessa, like St. Petersburg and Moscow, received in 1863 a new municipal constitution, with an elective mayor, municipal assembly, and executive council. It is also the chief town of the Novorossian educational district, and has a university, which replaced Richelieu Lyceum in 1865, and now has about 400 students. There are also an historical society with a museum containing rich collections from the Hellenic, Genoese, Venetian, and Mongolo-Tartar periods of the history of the Black Sea coast, a society of agriculture, a public library, and many educational institutions.

The population of Odessa is rapidly increasing. In 1814, twenty years after its foundation, it had 25,000 inhabitants. In 1850 Odessa had 100,000 inhabitants, 185,000 in 1873, and at present (1890) the number is near 250,000. Of these the great majority are Great Russians and Little Russians; but there are also large numbers of Jews (67,000, exclusive of Karaites, against 50,000 in 1873), as well as of Italians, Greeks, Germans, and French, as also of Roumanians, Servians, Bulgarians, Tartars, Armenians, Lazes, Georgians, etc.

The leading occupations of the inhabitants are connected with exporting, shipping, and manufactures. These latter have extended rapidly within the last twenty years, but their aggregate production does not exceed 20,000,000 rubles (about \$10,000,000). The foreign trade, chiefly in corn, has immensely increased of late, since Odessa was brought into railway communication with central Russia.

ODEYPOOR, or UDAIPUR. See CHUTIA NAGPUR.

ODIN, or WODAN. See GERMANY and MYTHOLOGY.

ODOACER, or ODOVACAR, the first barbarian ruler of Italy on the downfall of the Western empire, was born in the district bordering on the middle Danube about the year 434. In this district the once rich and fertile provinces of Noricum and Pannonia were being torn piecemeal from the Roman empire by a crowd of German tribes. With all of these Odoacer was connected by his subsequent career, and all seem, more or less, to have claimed him as belonging to them by birth; the evidence slightly preponderates in favor of his descent from the Scyri.

Odoacer was probably about thirty years of age when he left his country and entered the imperial service, and forty-two years of age when he became chief ruler of Italy, where he reigned thirteen years with undisputed sway. His internal administration was probably, upon the whole, wise and moderate, though we hear some complaints of financial oppression, and he may be looked upon as a not altogether unworthy predecessor of Theodoric.

In the history of the papacy Odoacer figures as the author of a decree promulgated at the election of Felix II. in 483, forbidding the pope to alienate any of the lands or ornaments of the Roman Church, and threatening any pope who should infringe this edict with anathema. The chief events in the foreign policy of Odoacer were his Dalmatian and Rugian wars.

This Rugian war was probably an indirect cause of the fall of Odoacer. His increasing power rendered

him too formidable to the Byzantine court, with whom his relations had for some time been growing less friendly. At the same time, Zeno was embarrassed by the formidable neighborhood of Theodoric and his Ostrogothic warriors, who were almost equally burdensome as enemies or as allies. In these circumstances arose the plan of Theodoric's invasion of Italy, a plan by whom originated it would be difficult to say. It is sufficient to state here that he entered Italy in August, 489, defeated Odoacer at the Isontius (Isonzo) on August 28th, and at Verona on September 30th. Odoacer then shut himself up in Ravenna, and there maintained himself for four years, with one brief gleam of success, during which he emerged from his hiding-place and fought the battle of the Addua (August 11, 490), in which he was again defeated. A sally from Ravenna (July 10, 491) was again the occasion of a murderous defeat. At length, the famine in Ravenna having become almost intolerable, and the Goths despairing of ever taking the city by assault, negotiations were opened for a compromise (February 25, 493). John, archbishop of Ravenna, acted as mediator. It was stipulated that Ravenna should be surrendered, that Odoacer's life should be spared, and that he and Theodoric should be recognized as joint rulers of the Roman state. The arrangement was evidently a precarious one, and was soon terminated by the treachery of Theodoric. He invited his rival to a banquet in the palace of the Laetum on March 15th, and there slew him with his own hand.

O'DONNELL. (1) HENRY JOSEPH, count of La Bisbal, a native of Spain, born in 1769 and died in 1834, was descended from the O'Donnells who left Ireland after the battle of the Boyne. He early entered the Spanish army, and in 1810 became general, receiving a command in Catalonia, where in that year he earned his title and the rank of field-marshal. He afterward held posts of great responsibility under Ferdinand VII., whom he served on the whole with constancy, but the events of 1823 compelled his flight into France, where he was interned at Limoges, and where he died. (2) LEOPOLD, Duke of Tetuan, Spanish general and statesman, the second son of Henry Joseph O'Donnell, was born at Santa Cruz, Teneriffe, on January 12, 1809. He fought in the army of Queen Christina, accompanied the queen into exile, failed in an attempt to effect a rising in her favor at Pamplona in 1841, but took a more successful part in the movement which led to the overthrow and exile of Espartero in 1843. From 1844 to 1859 he served in Cuba, became war minister under Espartero, was head of the cabinet, commanded the expedition to Morocco, and received the title of duke after the surrender of Tetuan. Quitting office in 1863, he again resumed it in June, 1865, but was compelled to resign in favor of Narvaez in 1866, and died at Bayonne, November 5, 1867.

ODORIC, styled of Pordenone, one of the notable travelers to the farther East in the Middle Ages, and a *Beatus* of the Roman Church, was born at Villa Nuova, a hamlet near the town of Pordenone in Friuli, in or about 1286, and died January 14, 1331, and, according to ecclesiastical biographers, in early years took the vows of the Franciscan order and joined their convent at Udine, the capital of Friuli. Friar Odoric was dispatched to the East about 1316-18, and did not return till near 1330, but, as regards intermediate dates, all that we can deduce from his narrative or other evidence is that he was in western India soon after 1321, and that he spent three years in China between 1322 and 1327.

No distinct indication of his homeward route is given, though it may be gathered from fragmentary notices that he passed through Khorasan, and so probably by

Tabriz to Europe, reaching Venice in the end of 1329 or beginning of 1330. Shortly after his return Odoric betook himself to the Minorite house attached to St. Antony's at Padua, and it was there that in May, 1330, he related the story of his travels, which was taken down in homely Latin by Friar William of Solagna. Traveling toward the papal court at Avignon, Odoric fell ill at Pisa, and, turning back to Udine, the capital of his native province, died in the convent there.

ODYSSEUS is of all the Greek heroes the most typical representative of the Greek race. He was son of Laertes and Anticleia, and king of Ithaca, a small rocky island on the western side of Greece. He married Penelope, but very soon after his marriage he was summoned to the Trojan war. Unwilling to go, he feigned madness, but Palamedes discovered his deceit by means of his care for his infant child Telemachus. Obligated to go to the war, he distinguished himself as the wisest counselor of the Greeks. When Troy was captured he set sail for Ithaca, encountering many adventures in all parts of the unknown seas, among the lotus-eaters and the Cyclopes, in the isles of Æolus and Circe and the perils of Scylla and Charybdis, among the Læstrygons; he escaped to the island of Calypso, where he was detained eight years, an unwilling lover of the beautiful nymph. Then at the command of Zeus he was sent homeward, but was again wrecked on the island of Phæacia, whence he was conveyed to Ithaca. Here he found that a host of suitors, taking advantage of the youth of his son Telemachus, were wasting his property and trying to force Penelope to marry one of them. The stratagems and disguises by which he with a few faithful friends slew the suitors are described at length in the *Odyssey*.

ÆCOLAMPADIUS, JOHN, was born in 1482 at Weinsberg, a small town in the north of the modern kingdom of Würtemberg, but then belonging to the Palatinate. He seems at first to have intended to study for the profession of law, and went to Bologna, but soon returned to Heidelberg and betook himself to theology. He went from Heidelberg to Tübingen, and thence to Stuttgart, and after some earlier essays in preaching became pastor at Basel in 1515. While in Basel preaching did not absorb all his energies; he was in daily intercourse with learned friends at the university, and pursued his literary researches and humanist studies. Zwingli's famous disputation at Zurich in 1523 fired the minds of many in Switzerland, and among others stirred Æcolampadius to make a more decided stand for reformation. He began to imitate Zwingli and preach Reformed doctrine. Basel was slow to accept the Reformation; the news of the Peasants' War and the inroads of Anabaptists prevented progress; but at last, in 1525, it seemed as if the authorities were resolved to listen to schemes for restoring the purity of worship and teaching. In 1528 the mass and image worship were at last abolished by authority, and Æcolampadius' five years' struggle was ended. He lived on, growing in influence in Basel and throughout south Germany, three years longer, and died in November, 1531.

OEDENBURG, one of the oldest towns in Hungary, the chief place of a district of its own name, lies three miles to the west of the Lake of Neusiedl and thirty-five miles to the south-southeast of Vienna. The inhabitants, most of whom are of German descent, are mainly engaged in making wine, of which the district yields a quality little inferior to Tokay. The crystallized fruits of Oedenburg form a well-known article of commerce; and a trade in grain and manufactures of beetroot sugar, starch, and cloth are also carried on. Large cattle-markets are held here. Population (1890), 25,222.

ŒDIPUS, a Theban hero, is placed by genealogists among the descendants of Cadmus. His father Laius ordered him to be exposed as soon as he was born; he grew up ignorant of his parentage, and meeting his father once in a narrow way he quarreled with him and slew him. The country was ravaged by a monster, the Sphinx; Œdipus by his cunning solved the riddle that the Sphinx proposed to its victims, freed the country and married his own mother, Jocaste. The latter hanged herself, and Œdipus lived as king in Thebes, tormented by the Erinnyes of his mother. In the tragic poets the tale takes a different form. The sequel of the tale is told in *Œdipus at Colonus*. Banished from the land by his sons, he is tended by the loving care of his daughters. He comes to Attica and dies in the grove of the Eumenides at Colonus, in his death welcomed and pardoned by the fate which had pursued him throughout his life.

OEHLENSCHLÄGER, ADAM GOTTLÖB, the greatest of modern Danish poets, was born in Vesterbro, a suburb of Copenhagen, on November 14, 1779. At the age of nine Adam began to make fluent verses. Three years later, while walking in the Frederiksberg Gardens, he attracted the notice of the poet Edvard Storm, and the result of the conversation was that he received a nomination to the college called "Posterity's High School," an important institution of which Storm was the principal. He now, in his eighteenth year, suddenly took up study with great zeal, but soon again abandoned his books for the stage, where a small position was offered him. In 1797 he made his appearance on the boards in several successive parts, but soon discovered that he possessed no real histrionic talent, even though he was trained by the great actor Michael Rosing. The brothers Oersted, the eminent savants, with whom he had formed an intimacy fruitful of profit to him, persuaded him to quit the stage, and in 1800 he entered the university of Copenhagen as a student. Oehlenschläger met the philosopher Henrik Steffens, one day, at Dreier's Club, and after a conversation of sixteen hours, which has become famous in the history of anecdote, went home, and wrote at a sitting his splendid poem *Guldhornene*, in a manner totally new to Danish literature. The result of his new enthusiasm speedily showed itself in a somewhat hasty volume of poems, published in 1803, now chiefly remembered as containing the lovely piece called *Sanct-Hansaften-Spil*. The next two years saw the production of several exquisite works, in particular *Thors Reise til Jotunheim*, the charming poem in hexameters called *Langelandsreisen*, and the bewitching piece of fantasy, *Aladdin's Lampe*. At the age of twenty-six Oehlenschläger was now universally recognized, even by the opponents of the romantic revival, as the leading poet of Denmark. He left his native country for the first time in 1805, joining Steffens at Halle during August of that year, where he wrote the first of his great historical tragedies, *Hakon Jarl*, which he sent off to Copenhagen, and then proceeded for the winter months to Berlin, where he associated with Humboldt, Fichte, and the leading men of the day. In the spring of 1806 he went on to Weimar, where he spent several months in daily intercourse with Goethe. The autumn of the same year he spent with Tieck in Dresden, and proceeded in December to Paris. Here he resided eighteen months and wrote his three famous masterpieces, *Baldur hin Gode*, *Palnatoke* (1807), and *Axel og Valborg* (1808). In July, 1808, he left Paris, and spent the autumn and winter in Switzerland as the guest of Madame de Staël-Holstein at Coppet, in the midst of her famous circle of wits. In the spring of 1809 Oehlenschläger went to Rome to visit Thorwaldsen, and in his house wrote his tragedy of *Correg-*

gio, in German; he translated this into Danish the following year. After an absence of nearly five years he hurriedly returned to Denmark in the spring of 1810, partly to take the chair of æsthetics at the university of Copenhagen, partly to marry the sister-in-law of Rahbek, to whom he had been long betrothed. His first course of lectures dealt with his Danish predecessor Evald, the second with Schiller. From this time forward his literary activity became very great; in 1811 he published the Oriental tale of *Ali og Gulhyndi*, and in 1812 the last of his great tragedies, *Stærkodder*. His talent may be said to have culminated in the glorious cycle of verse-romances called *Helge*, published in 1814. On January 20, 1850, he sank, conscious to the last, and was buried in the cemetery of Frederiksberg.

OELS, chief town of a circle in Prussian Silesia, and the capital of a principality of its own name, lies in a sandy plain on the Oelsa, eighteen miles to the northeast of Breslau. The inhabitants, numbering about 12,157 in 1890, are chiefly engaged in making shoes and growing vegetables for sale at Breslau.

ŒNANTHIC ACID AND ETHER. Liebig and Pelouze, by distilling large quantities of wine, obtained from the very last fractions of the distillate an oil which in a very high degree exhibited the generic smell common to all wines—the smell which a small remnant of any kind of wine left in an open bottle exhibits after the "bouquet" is gone—"œnanthic acid." An oil similar to Liebig and Pelouze's œnanthic ether was isolated by Wöhler from quince-peel. Liebig and Pelouze's results were called in question by Delffs, who by experiments of his own arrived at the result that their œnanthic acid is identical with pelargonic, which latter is known as a component of the volatile oil of *Pelargonium roseum*. The general impression among chemical wine-specialists seems to be that Liebig and Pelouze's œnanthic acid was a mixture of capric, caprylic, and other fatty acids. The notion of œnanthic acid must not be mixed up with that of œnanthylic acid, the acid of primary heptyl-alcohol. The aldehyde, intermediate between the two, is procured by the destructive distillation of castor oil, and from it the acid is easily prepared by oxidation with dilute chromic acid.

ŒNOMAUUS was king of Olympia, where his wooden house was still shown in the Altis, the sacred precinct, when Pausanias visited it. It was fated that he should be slain by the husband of his daughter Hippodamia. His father, the god Ares-Hippios, gave him winged horses swift as the wind, and he promised his daughter to the man who could outstrip him in the chariot race; those suitors who were beaten died by his hand. Pelops, by the treachery of Myrtilus, the charioteer of Œnomaus, won the race and married Hippodamia.

OESEL, one of the largest islands in the Baltic, forming, with Abro, Mohn, Runo, etc., a district of the Russian government of Livonia, lies across the mouth of the Gulf of Riga. According to Strelbitsky it contains an area of 1,010 square miles. Its undulating surface, well watered by numerous streams, and consisting mainly of clay and disintegrated limestone, is largely occupied by woodland and pasture, but also allows the cultivation of considerable quantities of grain, flax, hemp, and potatoes. The coasts are bold and steep, and especially toward the north and west form precipitous limestone cliffs. The population, numbering 50,566 in 1889, is mainly Protestant in creed, and with the exception of the nobility, the clergy, and some of the townsfolk, Esthonian by race. The chief town, Arensburg, on the south coast at the mouth of the Peddus, is a place of from 3,000 to 4,000 inhabitants.

ŒTA. See THESSALY.

OFEN. See BUDA.

OFFENBACH, the principal manufacturing town in the grand-duchy of Hesse-Darmstadt, lies on the left bank of the Main, five miles above Frankfort. The manufactures of Offenbach are of the most varied description, including carriages, machinery, hardwares, chemicals, aniline dyes, soap, perfumery, candies, chicory, gingerbread, tobacco and cigars, shoes, hats, felt goods, wax-cloth, paper, varnish, white lead, types, canvas, and woolen cloth. Its characteristic industry, however, is the manufacture of portfolios, pocket-books, albums, and other fancy goods in leather, which are largely exported to England and the United States, and other countries. The population in 1880 was 28,449, and is now (1890) estimated at 32,000.

OFFENBACH, JACQUES, the inventor of the latest form of the modern *opéra bouffe*, was born at Cologne, of Jewish parents, June 21, 1819. His talent for music was developed at a very early age; and in 1833 he was sent to Paris to study the violoncello at the *conservatoire*. In 1834 he was admitted into the orchestra of the Opéra Comique as a "ripieno" violoncellist. His next appointment was that of conductor at the Théâtre Français, where, in 1848, he made his first success as a composer in the "Chanson de Fortunio," in Alfred de Musset's play *Le Chandelier*. From this time forward his life became a ceaseless struggle for the attainment of popularity. His first complete work, *Pepito*, was produced at the Opéra Comique in 1853. This was soon followed by a crowd of dramatic trifles, which daily gained in favor with Parisian audiences, and eventually effected a complete revolution in the popular taste of the period. Encouraged by these early successes, Offenbach now boldly undertook the delicate task of entirely remodeling both the form and the style of the light musical pieces. With this purpose in view he obtained a lease of the Théâtre Comte in the Passage Choiseul, and reöpened it under the title of the Bouffes Parisiens. Beginning with *Les Deux Aveugles* and *Le Violoneux*, the series was continued with almost unexampled rapidity, until, in 1867—twelve years after the opening of the theater—its triumph culminated in *La Grande Duchesse de Gérolstein*, perhaps the most popular *opéra bouffe* ever written, not excepting even his *Orphée aux Enfers*, produced in 1858. From this time forward the success of Offenbach's pieces became an absolute certainty. In twenty-five years he produced no less than sixty-nine complete dramatic works, some of which were in three or even in four acts. Among the latest of these were *Le Docteur Ox*, founded on a story by Jules Verne, and *La Boite au Lait*, both produced in 1877. Offenbach died in 1880.

OFFICE, TENURE OF. The Tenure-of-Office Act was a measure adopted by Congress in 1867, both branches then being overwhelmingly Republican, and providing for the retention in office of certain civil officers unless their removal was accomplished by and with the consent of the Senate. It was formulated and became a law as a means of preventing President Andrew Johnson's enforcing what at that time was described as "my policy," the same being claimed to be in direct opposition to laws adopted by Congress for the reconstruction of the States lately in rebellion. It was for an alleged violation of the Tenure-of-Office Act that the impeachment of President Johnson was sought in February, 1868. The act was subsequently repealed.

OGAM. See CELTIC LITERATURE.

OGDEN, situated in the great plain which extends from the Rockies to the Sierra Nevada, and from the Gulf to the northern territories, is the trading and distributing point for an immense section of country, imme-

diate and remote. It is the county seat of Weber county, Utah, located in sight of Ogden Peak, and on Weber river, at a point where that stream passes through the Wasatch Range, 37 miles north of Salt Lake City, 1,031 miles west of Omaha, 530 miles east of San Francisco, and claimed to be the only point in the Rocky Mountains whence railroads penetrate in all directions. The railroad facilities are exceptionally desirable, embracing the Union Pacific, Central Pacific, Utah Central and Rio Grande Western, while the banking, commercial, religious and educational conveniences are equally complete and comprehensive. It contains one daily and one weekly paper, four hotels, an opera-house and three public halls, with a total capacity of between 3,000 and 4,000, and other evidences of growth and development. Ogden is the location of machine and repair shops of the Central Pacific, and by reason of the cheap facilities, supplies of raw material, transportation accommodations, steady supply of labor to be obtained here, and the ready and convenient markets available, the city gives promise of becoming a conspicuous manufacturing center. At present it is the location of ironworks, machine-shops, mining machinery and farm-implement works, planing, woolen, saw and flour mills; furniture, confectionery, sash, baking-powder, cornice, brick and cigar factories; fruit canning, electric-light and broom factories, together with breweries and depots for the manufacture of mineral waters. The mercantile interests are represented by nearly 200 stores, and the population was 14,889 in 1890. As a summer resort, a sanitarium, the objective point for tourists and artists, Ogden presents abundant attractions. As a mining and agricultural center its reputation long since became established.

OGDENSBURG, a city and port of entry of the United States, in St. Lawrence county, New York, on the St. Lawrence river, at the mouth of the Oswegatchie, seventy-two miles below Lake Ontario. It is an important railway junction, being also the terminus of the Ogdensburg and Lake Champlain, the Utica and Black River, and the Rome, Watertown and Ogdensburg Railroads, and the headquarters of the Northern Transportation Company's line of steamers; ferry steamers also connect it with Prescott on the Canadian side of the river. Ogdensburg is regularly laid out, and shade-trees are so numerous that it is popularly called "Maple City." Among its buildings that used by the United States postoffice and courts and the great Roman Catholic church of St. Jean Baptiste are of some note. A very extensive trade is carried on in timber and flour. The population was 7,409 in 1860, 10,076 in 1870, and 10,341 in 1880, and 11,662 in 1890.

The site of Ogdensburg was first occupied by the Indian settlement of La Presentation, founded by Abbé Piquet for the Christian converts of the Five Nations. Garrisoned by the British in 1776, the fort continued to be held by them after the Revolution till 1796 (Jay's treaty). In 1812 it was attacked, and in 1813 captured by a British force; and in 1838, having become a rallying point for the British malcontents under Von Schultze, it was regularly besieged and taken. The village was incorporated in 1817, and named after Samuel Ogden, the proprietor. The city charter dates from 1868.

OGLETHORPE, JAMES EDWARD, general, the founder of the State of Georgia, was born in London December 21, 1696, the son of Sir Theophilus Oglethorpe, of Godalming, Surrey. He entered Corpus Christi College, Oxford, in 1714, but in the same year joined the army of Prince Eugène. Through the recommendation of the duke of Marlborough he became aide-de-camp to the prince, and he served with distinction in the campaign against the Turks, 1716-17, more

especially at the siege and capture of Belgrade. After his return to England, he was in 1722 chosen member of parliament for Hazlemere. He devoted much attention to the improvement of the circumstances of poor debtors in London prisons; and for the purpose of providing an asylum for persons who had become insolvent, and for oppressed Protestants on the continent, he projected the settlement of a colony in America between Carolina and Florida. A full account of the enterprise and the subsequent relation of Oglethorpe to the colony will be found in the article GEORGIA. In 1745 Oglethorpe was promoted to the rank of major-general. His conduct in connection with the Scottish Rebellion of that year was the subject of inquiry by court-martial, but he was acquitted. In 1765 he was raised to the rank of General. He died at Cranham Hall, Essex, July 1, 1785.

OGOWAY, or OGOWE, a river of West Africa which falls into the Atlantic 400 miles north of the mouth of the Congo. The extent of its delta, and the immense volume of water which it brings down when in flood, gave origin to the belief that it must either be a bifurcation of the Congo or one of the leading arteries of the continent. The former view was set aside; but so recently as 1876 Czerny advocated the identity of the Ogoway with Schweinfurth's famous Uelle (Welle), with Nachtigal's Bahr-Kuta, and with Barth's river of Kubanda, thus taking it right across to the neighborhood of the Nile basin. Savorgnan de Brazza claims to have reached (1882) the sources of the river in a rugged, sandy, and almost treeless plateau, which forms the watershed between its basin and that of the Congo, whose main stream is only 140 miles distant. Cutting its way athwart the gneiss and schists of the various ranges of the Sierra Complida, the main stream of the Ogoway (often called the Okanda from one of the tribes on its banks) is interrupted with cataracts and rapids (at Fare, twenty-six feet, and Dume, for example) till within a comparatively short distance from the confluence with its principal left-hand affluent, the Ngunie.

Though Bowditch called attention in 1817 to the existence of the river, it was not till 1857-59 that its exploration was begun by Du Chaillu. It has since been made known by the labors of Serval and Griffon du Ballay, R. B. N. Walker, Aymés, the marquis de Compiègne, A. Marche, Oskar Lenz, and Savorgnan de Brazza. English and German factories were founded about 1868 at Adelina Longa (Adaûlinaûlonga), and at Franceville, a station of the International African Association, in 1880.

OGYGES, in the legends of Attica and Bœotia, was an early king in whose reign a great flood had overwhelmed the land. A similar legend was current in Phrygia, where the flood was said to have taken place in the reign of Nannacus. No facts are known connecting Ogyges with any religious cultus in Greece, and it is highly probable that the tale was of Oriental origin, introduced into this district of Greece by foreign colonists or traders.

OHIO is bounded on the north by Michigan and Lake Erie, on the east by Pennsylvania, on the east and south by the Ohio river, which separates it from the States of West Virginia and Kentucky, and on the west by Indiana. The greatest length from north to south is about 210 miles, the greatest breadth from east to west about 225 miles and the area 40,760 square miles.

The surface consists of an undulating plain, generally ranging in elevation between 1,550 and 430 feet above sea-level, the portions below 500 feet or above 1,400 being comparatively insignificant.

The chief feature in the topography of Ohio is the

water-shed, which extends across the State from north-east to southwest, and divides its surface into two unequal slopes, the northern, which is much the smaller, sending its waters into Lake Erie and the Gulf of St. Lawrence, while the drainage of the other is to the Gulf of Mexico by the Ohio river. The average height of the ridge is about 1,100 feet, but it is cut by several gaps, in which the elevation is reduced to about 950 feet. The relief of the State is chiefly due to erosive agencies. Fragments of the old plain still remain in the isolated "hills" or tablelands that bound the valleys, and which, though often separated by intervals of miles, still answer to each other with perfect correspondence of altitude and stratification. They rise to a maximum height of 600 feet above the river-channels in the main valleys.

The *Carboniferous Conglomerate* and the *Coal-measures* have an aggregate thickness of at least 1,500 feet, and cover more than 10,000 square miles of the surface of Ohio. The beds of coal, iron-ore, fire-clay, limestone, and cement rock that they contain render insignificant the contributions made by all other formations to the mineral wealth of the State. The Lower Coal-measures, which are here made to include the Conglomerate group of coals of Pennsylvania, contain the seams of coal, which are distributed through 500 to 800 feet of strata.

All these coals belong to the bituminous division. Thus far they are almost entirely worked in level free mines, and very little is taken from seams less than three feet in general thickness. The average thickness in the important fields is five feet, and the maximum (a small area of a single district) thirteen feet. All of the seams enumerated above are worked, but they have very unequal values. The Pittsburgh coal is, all things considered, the most important seam of the entire coal-field to which it belongs. It is especially valued as a gas coal, and for the production of steam. Its northern outcrop passes through nine counties, with an approximate length of 175 miles, not counting the sinuosities. The area commonly assigned to it in Ohio exceeds 3,000 square miles, but the seam has been proved for only a small fraction of the area claimed. In the production of bituminous coal in the United States Ohio ranked third in 1880, the output for that year being about 6,000,000 tons, but the production is rapidly increasing, and the State inspector of mines reckoned the output in 1882 at 8,000,000 tons, and 10,500,000 in 1888.

Iron ore is worked at many horizons in the Coal-measures, in seams ranging from six inches to nineteen feet in thickness. The charcoal iron of the Hanging Rock district of southern Ohio is chiefly applied to the highest uses, as the manufacture of car-wheels and castings for agricultural and other machinery. Of the ninety-nine furnace-stacks that now stand in Ohio, almost all depend in part, and about half depend entirely, on native ore. The amount mined annually exceeds 500,000 tons. In iron and steel industries Ohio ranks next to Pennsylvania, the value of the annual product being \$35,000,000. The clays of the Coal-measures are the basis of a large and rapidly growing manufacture of stone and earthen ware. Ohio now produces one-third of the total product of the United States. In connection with the salt production, which is large, about half of the bromine of the world is produced in Ohio. The brine of the Tuscarawas valley yields nearly one pound of bromine to one barrel of salt. In the total value of quarry products Ohio ranks first among the States, more than \$2,500,000 being reported in 1880.

The division of the State into a drift-covered and driftless region coincides with the most important division of the soils. Below the line of the terminal



moraine these are "native," or, in other words, they are derived from the rocks that underlie them, or that rise above them in the boundaries of the valleys and uplands. They consequently share the varying constitution of these rocks, and are characterized by considerable inequality and by abrupt changes. All are fairly productive, and some, especially those derived from the abundant and easily-soluble limestones of the Upper Coal-measures, are not surpassed in fertility by any of the soils of the State. Large tracts of these excellent native soils are found in Belmont, Monroe, Noble, and Morgan counties. Among the thinner and less productive soils, which occupy but a small area, are those derived from the Devonian shales. They are, however, well adapted to forest and fruit production. The chestnut and the chestnut oak, both valuable timber-trees, are partial to them, and vineyards and orchards thrive remarkably. The native soils of the Waverly group and of the Lower Coal-measures agree in general characteristics. They are especially adapted to forest growth, reaching the highest standard in quality of timber product. When these lands are brought under the exhaustive tillage that has mainly prevailed in Ohio thus far, they do not hold out well, but the farmer who raises cattle and sheep, keeps to a rotation between grass and small grains, and does not neglect fruit can do well upon them. The other great division of the soils of Ohio—viz., the Drift soils—are by far the most important, alike from their greater area and their intrinsic excellence. Western Ohio is underlain with Silurian limestones, and the Drift is consequently limestone Drift. The soil is so thoroughly that of limestone land that tobacco, a crop which rarely leaves native limestone soils, is grown successfully in several counties of western Ohio, 100 miles or more north of the terminal moraine. The native forests of the Drift regions were, without exception, hardwood forests, the leading species being oaks, maples, hickories, the walnut, beech, and elm. The walnut, sugar maple, and white hickory are limited to warm, well-drained limestone land; the white oak characterizes the upland clays, while the red maple, the elm, and several of the oaks stand for the regions of sluggish drainage. This growth is rapidly disappearing, but several million acres still remain.

There is a difference of at least 40° Fahr. between the average summer and winter temperatures. A central east-and-west belt of the State is bounded by the annual isotherms of 51° and 52°, the average winter temperature being 30° and the average summer temperature 73°. Southern Ohio has a mean annual temperature of 54°, and Northern Ohio 49°. The annual range is not less than 100°, and sometimes 130°, the extreme of summer heat reaching 100° in the shade, while "cold waves" in winter may depress the mercury to 30° below zero. Extreme changes are liable to occur in the course of a few hours, especially in winter, when the return trades are violently displaced by northwest winds. In such cases the temperature sometimes falls 60° Fahr. in twenty-four hours; changes of 20° or 30° in a day are not unusual. Still the climate proves itself excellently adapted to the finer growth of vegetation, while its effects on human life and on the domestic animals favor a symmetrical development and a high degree of vigor. The rainfall varies between an average of forty-six inches in the Ohio valley and an average of thirty-two inches on the shore of Lake Erie (spring 10 to 12 inches, summer 10 to 14 inches, autumn 8 to 10 inches, winter 7 to 10 inches). The annual range is considerable. In some years there is an insufficient supply and in some there is a troublesome excess. The vast body of water in Lake Erie favorably modifies the climate of the northern margin of the State. The belt

immediately adjoining is famous for the fruits that it produces. Extensive vineyards and orchards have been planted along the shore and on the islands adjacent, and have proved very successful. The Catawba wine here grown, ranks first among the native wines of eastern North America. Melons of excellent quality are raised in almost every section of the State. The peach is the least certain of all the fruits that are largely cultivated; there is rarely, however, a complete failure on the uplands of southern Ohio. The winters of Ohio are very variable. Snow seldom remains for thirty days at a time over the State at large, but an ice crop rarely fails in northern Ohio, and not oftener than once in three or four years in other parts of the State. In the southern counties cattle, sheep, and horses often thrive on pasture grounds through the entire winter.

The following table gives the population from 1840 to 1880:

YEAR.	POPULATION.		
	Total.	Males.	Females.
1840.....	1,519,467	784,100	735,367
1850.....	1,980,329	1,016,808	963,521
1860.....	2,339,511	1,190,162	1,149,349
1870.....	2,665,260	1,337,550	1,327,710
1880.....	3,198,062	1,613,936	1,584,126

The State has flourished in the last decade and its population (1890 census) is 3,672,316.

Agriculture is the leading industry, employing in 1880 397,495 persons, or about two-fifths of the total number reported as engaged in occupations of all sorts.

In 1890 the yield of wheat was estimated by the United States department of agriculture at 31,663,448 bushels; corn, 87,838,192 bushels; oats, 35,896,089 bushels. Over 20,000,000 pounds of tobacco were grown. In 1890 the number of farm animals was: horses, 828,301; mules, 23,870; milch cows, oxen and other cattle, 1,468,806; sheep, 3,593,209; hogs, 1,888,175. There were 6,837 establishments, employing 245,600 persons, and an invested capital of \$202,990,836. The sheep-growing counties are supplied with the best breeds of sheep, and the wool of southeastern Ohio has long been famous for unusual strength of fiber. The production of wool in 1889 was 18,287,869 pounds, Ohio holding the first rank in this respect among the States of the Union. In the origination of agricultural machinery Ohio has taken a leading part, and in the present manufacture it easily holds the first rank, the value of the annual product exceeding \$15,500,000, or one-fourth of the entire product of the United States. The average yield of wheat in the State has been doubled within the last ten years through the use of artificial fertilizers and improved methods of cultivation. An efficient system of crop reports is carried on by a State board of agriculture, and thorough control of the artificial manures sold in the State is maintained by constantly repeated chemical analyses. A State meteorological bureau also renders special service to the agricultural interest.

The manufactured products of the State, according to the report of the State Bureau of Statistics, were valued in 1888 at \$348,519,450. As a necessary result of the recent development of mining and manufacturing in Ohio, its cities and villages are gaining rapidly in population and wealth. Cincinnati, the largest city of the State, had a population of 255,139 in 1880, and has now (1890 census), 296,908 inhabitants. The same census credits it with about 30 per cent. of the manufactures of the State, but the reports of its cham-

ber of commerce give it a much greater total than the census tables. Cleveland, the second city of Ohio, Columbus, the State capital, Toledo, Dayton, Springfield, Youngstown, Canton, Akron, and Zanesville are all thriving and energetic cities.

All legislative power is vested in a general assembly consisting of a senate and house of representatives. Senators and representatives are elected biennially. The executive department consists of a governor, a lieutenant-governor, a secretary of state, a treasurer, and an attorney-general, all elected for a term of two years, with an auditor, elected for four years. The supreme executive power is vested in the governor, who is commander-in-chief of the militia, and may grant reprieves and pardons. The lieutenant-governor is president of the senate. There is also elected triennially a State commissioner of common schools. For the control and superintendence of all public works a board of public works is created, consisting of three members, each elected for three years. There are appointed by the governor, by and with the consent of the senate, a commissioner of railroads and telegraphs for two years, a superintendent of insurance for three years, an inspector of mines for four years, a commissioner of statistics of labor for two years; also a supervisor of public printing, a State librarian, an inspector of leaf tobacco, and a State inspector of oils for two years each, and three commissioners of fisheries for three years each. To investigate the whole system of public charities, and correctional and penal institutions of the State, eight persons, four from each of the leading political parties, are appointed by the governor for four years, each to constitute a board of State charities. The judicial power is vested in a supreme court, district courts, common pleas courts, probate courts, and justices of the peace; and the legislature may create courts inferior to the supreme court in one or more counties. The supreme court consists of five judges, elected for five years each. There are nine common pleas districts with three judges each, holding office for five years; each district is divided into three parts, with one judge (and more if the legislature so provide) for each part. The district court is composed of the judges of the common pleas district, together with one of the supreme court judges, any three forming a quorum. The original jurisdiction of the district court is concurrent with that of the supreme court; each county has a probate court for probate and testamentary matters. Townships are supplied with justices of the peace. All judges and justices are elected by the people. Clerks of the courts are elected by the people also. The State is divided into two Federal court districts, a northern and a southern. Each district is divided into an eastern and western division. All elections are by ballot, and every sane male citizen, twenty-one years old and a resident of the State for one year next preceding election, may vote. Education is provided for by taxation and funds arising from the sale of public lands. The insane, blind, and deaf and dumb are supported by the State. A sinking fund, sufficient for discharging annually the interest of the public debt and not less than \$100,000 of the principal thereof, is provided from the proceeds of the public works, sale of canal, school, and escheated lands, and taxation. The State at present is represented in the Congress of the United States by two senators and twenty-one representatives. The legislature of the State is empowered to lay off new or change existing counties. The electors in each county elect three commissioners, for three years each, who constitute the county board. They have the care of the county property, fix the taxes, regulate roads, and provide for idiots, lunatics, and paupers. The other offi-

cers are three infirmity directors, an auditor, a secretary of the commissioners, a recorder, a surveyor, a clerk of the court of common pleas, who is also clerk of the district court, each elected for three years; also a treasurer, a sheriff, a coroner, and a prosecuting attorney, each elected for two years. In a county that has in it a city of over 180,000 population there is a board of control, consisting of five members, each elected for three years, which has a final action and jurisdiction in all matters involving expenditure of money. Each county must contain at least 400 square miles of territory. Counties are subdivided into townships, the power to do which resides in the county commissioners. Each township must contain at least twenty-two square miles, and be at least one election precinct. The officers are three trustees, a clerk, a treasurer, such constables as the trustees may designate, and an assessor, elected annually. The trustees oversee elections, provide for the repairing of roads, make regulations preventing the spread of diseases, provide for cemeteries and libraries if the voters determine to have them, and afford relief to the poor.

The Continental Congress in 1785, in an ordinance for the survey of the lands northwest of the Ohio, reserved section number sixteen in every township, equivalent to one thirty-sixth of the township, for the support of public schools. These provisions did not apply to the Virginia military and Connecticut reserves, equal in area to about one-fourth of the entire State, nor to the United States military reservation, embracing nearly 4,000 square miles. The convention that framed the State constitution in 1802 requested and obtained of Congress a concession of one thirty-sixth of the lands in the Virginia and United States military reservations, and a like proportion for education in the Connecticut Reserve—a portion of the latter, however, being set apart in the United States military reservation, the remainder from the public lands in the northwestern part of the State (1834). Prior to 1827 the only revenues obtained from such lands were of the nature of rents, and were wholly inadequate. In the year named a law was passed providing for the sale of the school lands, other laws also being enacted for the establishment of a fund for the support of common schools. The State early undertook to supplement the revenue thus acquired by a general tax; the present law provides for a tax of one mill on the dollar. At present the law authorizes every board of education to determine the amount of tax to be levied as a contingent fund for all school expenses, not exceeding seven mills on the dollar. As early as 1827 the legislature adopted the policy of making offenders against the laws contribute to the support of the schools by appropriating fines collected to the school funds. This policy still continues.

The report of the State commissioner of common schools for 1890 gives the figures for the school year ending August 31, 1890, as follows:—School districts and subdivisions, 12,255, whole number of teachers, 25,156; persons of school age, 1,123,895; total enrolled, 797,439; total receipts, including balance from 1889, \$15,894,017; total expenditures, \$11,407,499; number of school-houses, 12,712; value of school property, \$32,631,549.

Higher education was not neglected by the first settlers of the State. In the Ohio Company's purchase two entire townships were granted, upon which the Ohio university was established. In the Symmes purchase a township of land was granted, which when located served as the foundation for the Miami university. There are now sixty-two such institutions for learning in the State, employing 457 teachers, having 11,314 students, receiving \$411,309 and expending

\$405,573, with a property valued at \$6,203,691. Of these, twenty-five are enabled by their charters to confer collegiate degrees. Among the oldest and most prominent of the colleges are Antioch, Denison, Kenyon, Marietta, Oberlin, Ohio Wesleyan, Otterbein, St. Xavier's, Western Reserve, and Wittenberg; of those more recently founded three deserve special mention, viz., the university of Cincinnati, the Case School of Applied Science at Cleveland, and the Ohio State university at Columbus. The first two are founded upon private munificence, and each is entering upon a career of great promise. The third, established upon a gift of public lands from the general government, is specially charged with instruction in the sciences relating to agriculture and the mechanic arts, and is also required to include military training. In addition, therefore, to the ordinary courses of an American college, this institution is obliged to provide full facilities in applied science, and the State makes use of its faculty and equipment for all its official scientific work.

The receipts of the State treasury for the year ending November 15, 1890, including a balance of \$381,659 brought forward, were \$6,235,337; the disbursements \$5,832,751, leaving a cash balance of \$402,586 on hand.

The public funded debt at the same date was \$2,541,665, a reduction of \$255,000 during the year. The debt bears 3 per cent. interest. The irreducible State debt (trust funds) was \$4,609,863. The total of municipal debt of all classes was \$62,992,956. The value of all taxable real estate in 1889 was \$1,754,197,344, and the taxes levied in 1890 were: for State purposes, \$4,734,010; for county purposes, \$8,832,368. Total taxes for all purposes amounted to \$36,176,691.

Ohio was discovered by La Salle, probably as early as 1670, and the French took formal possession of the whole Northwest in 1671. In 1749 all English settlers were warned by the French commandant at Detroit to retire from the region north of the Ohio. The settlements had been made under the third charter granted by King James I. to Virginia (March 12, 1611), which ceded to the colony all of the present State of Ohio lying south of 41° N. latitude, and that granted by Charles II. to Connecticut (April 23, 1662), which ceded to the colony all the territory of the present State lying north of 41° N. latitude. The conflicting claims were set at rest by the treaty of Paris in 1763, by which France surrendered to Great Britain all her lands in the north and west as far as the Mississippi. During the progress of the American Revolution, and while the States were struggling to form a union on the basis of the articles of confederation submitted for ratification in 1777, a controversy arose as to the rightful ownership of unoccupied lands. The States appealed to their charters, as did Virginia and Connecticut, for their title to the lands northwest of the Ohio. The opposing States claimed that the unoccupied lands, though charter lands, should be surrendered for the common benefit, to become the property of the new union. The controversy was settled in some cases, as in that of New York, by the abandonment of all claims by the State; in others, among them Virginia and Connecticut, compromises were entered into by which the States made large reservations in the acts of surrender. Virginia reserved for military bounty lands about 3,710,000 acres, lying between the Scioto and Little Miami rivers, and bounded on the south by the Ohio river. Connecticut reserved as a foundation for her school fund a tract extending 120 miles westward of the Pennsylvania line, bounded on the south by 41° N. latitude, and by the Connecticut line on the north. The land area extended to about 3,667,000 acres. In 1800 Connecticut sur-

rendered all jurisdictional right over these lands to the United States.

Among the last and most important acts of the Congress of the old confederation was its passing the ordinance of 1787, providing a government for the territory northwest of the Ohio. The ordinance is a remarkable document in many particulars, and especially for the clause in its sixth article, which reads: "There shall be neither slavery nor involuntary servitude in said territory otherwise than in the punishment of crimes, whereof the party shall have been duly convicted"—a clause which, after appearing in many State documents, at last became the property of the nation when it was adopted as the thirteenth amendment of the constitution of the United States. The passing of the ordinance was closely connected with the purchase of a million and a half of acres upon the Ohio, and in the Muskingum valley, by the Ohio Company. On July 9, 1788, General St. Clair, the governor, and his associates, Judges Parsons, Varnum, and Symmes, formally established the government of the Territory of Marietta, the newly-formed settlement of the company, situated on the Ohio at the mouth of the Muskingum, and named after Marie Antoinette. The next considerable purchase of land was made by Judge Symmes, who secured upward of 311,000 acres on the Ohio, between the Great and Little Miami rivers. The site of Cincinnati was purchased from Judge Symmes by Matthias Denman of New Jersey, whose surveys marked out, in the winter of 1788-89, the town that has since grown to be the leading city of the State. Two expeditions sent against hostile Indians at the headwaters of the Miamis in 1790 and 1791 resulted in such disastrous failure that the settlers began to despair of protection. However, in 1794 General Wayne won a decisive victory over the united tribes near the rapids of the Maumee, and at the treaty of Greenville, contracted a year later with eleven chiefs, secured peace. As a result, the rapid immigration which followed enabled the residents of the Territory to avail themselves of the provisions of the ordinance in organizing a representative government for the Territory by electing a legislature, which held its first session in Cincinnati September 24, 1799. By authority of Congress a convention which met at Chillicothe in November, 1802, drafted, and on the 29th day of the month signed and ratified for the people, the first constitution of Ohio. Several stipulations relative to school lands were made by the convention in the constitution submitted to Congress, which were conceded, and the State was admitted February 19, 1803, as the fourth under the constitution of the United States, and the seventeenth in the roll of the States. Chillicothe, which in 1800 had been made the seat of government for the Northwest Territory, continued to be the capital of the State until 1810, when the government removed to Zanesville for two years. Returning to Chillicothe, it chose Columbus, in 1816, as the permanent capital of the State.

In 1821 a movement for internal improvements was inaugurated, which culminated in the construction of a canal from the Ohio to Lake Erie through the valleys of the Scioto and the Muskingum, another from Cincinnati to Dayton. Fortunately the movement for common schools began at the same period. The canals set free the locked-up produce of the interior, and the State entered upon a new life. The completion of the Cumberland road in 1825, as far as Wheeling on the Ohio, gave the State an outlet to the seaboard. While the canals were yet incomplete the construction of railroads was undertaken. The Mad River and Lake Erie Railroad from Dayton to Sandusky was the first, being chartered in 1832 and actively begun in 1835. In

1852 three through lines had been opened across the State. The total mileage of railroads in Ohio in 1890 was 10,464 miles. The valuation of railroad property was \$102,950,642, and the taxes paid by railroads, \$1,720,831.

The present constitution is the result of a revision of that of 1802 by a convention which sat at Columbus and afterwards at Cincinnati in 1850-51. The revised constitution was adopted by the people June 17, 1851. A second revising convention met in 1873 and also sat in Columbus and Cincinnati, but its work was rejected by the people at the October election of 1874, and the affairs of the State are now being conducted under the old constitution.

OHIO RIVER. See MISSISSIPPI.

OHM, GEORGE SIMON, was born at Erlangen in 1781 and educated at the university there. He became professor of mathematics in the Jesuits' college at Cologne in 1817, and in the polytechnic school of Nuremberg in 1833, and in 1852 professor of experimental physics in the university of Munich. An electrical unit of measurement is named after him. He died July 6, 1854.

OIL-CAKE. The solid compressed mass remaining after the expression of oil from the many oil-yielding seeds, nuts, etc., forms a material of considerable commercial importance. It retains, after the most perfect treatment by pressure, no inconsiderable portion of oil, with practically the whole of the albuminous matter, sugar, mucilage, and the starchy components of the seeds, etc., thus forming in most cases a concentrated nutritious food for cattle and sheep, specially valuable for fattening store animals for the market. The only commercial cakes which are unfit for animal food are such as contain purgative or other active principles, as, for example, the cakes of castor-oil seed, croton-seed, purging-nut seed and mustard-seed. The most valuable and at the same time the most abundantly produced feeding cake is that obtained from ordinary LINSEED, (*q.v.*) Next in value is the cake yielded by rapeseed, but its wholesomeness is frequently marred by the presence of a large proportion of acrid mustard-seed; the best is that yielded by the German green rapeseed (*Brassica rapa oleifera*). Cotton-seed cake is also a feeding stuff of considerable importance. It is prepared in two forms, either as decorticated cake, in which the husks of the cotton-seed are removed previous to the expression of the oil, or as undecorticated cake, which may contain as much as 40 to 50 per cent. of indigestible woody husk. Among other cakes useful for feeding purposes may be enumerated groundnut cake from *Arachis hypogæa*, palm-kernel cake from the seeds of the oil palm, sesame or til cake from the seed of *Sesamum orientale*, and hemp cake from the seed of *Cannabis sativa*.

OIL CITY, a city of Venango county, Penn., at the junction of Oil Creek with the Allegheny river, lies 132 miles north-northeast of Pittsburgh by the Allegheny Valley Railroad, in the heart of the Venango petroleum district, and possesses the principal oil exchange of the world. The business part of the city is on the low ground north of the river, the residences occupying the south side and the high bluffs on the north side. Besides manufactories connected with the oil industry, the city has machine-shops, foundries, flouring-mills, and breweries. Founded in 1860, and partially destroyed by flood in 1865 and by flood and fire in 1866, Oil City was incorporated as a city in 1871. Its population was 7,315 in 1880, and in 1890 was 10,948.

OILS. The term oil is a generic expression under which are included several extensive series of bodies of diverse chemical character and physical properties. In its most comprehensive ordinary acceptance the word

embraces the hard, solid, odorless waxes, tallows, and fats, the viscid fluid fixed oils, the odorous essential oils, and the solid, fluid, and volatile hydrocarbons obtained in nature or by destructive distillation. Further, in former days, when substances were principally classified by obvious physical characteristics, the word applied to various substances which, beyond an oily consistency, possess no other properties in common with ordinary oils. Thus we have still in common use for sulphuric acid the term "oil of vitriol," a substance which, it need hardly be said, is widely different from any oil. Leaving out of account bodies of this nature, the remaining diverse bodies have in common the characteristics that they are compounds consisting principally, in some cases exclusively, of carbon and hydrogen, that they are mostly insoluble in water, and that they are all readily inflammable. The mineral hydrocarbons obtained either in nature or by destructive distillation do not come within the range of this article (see NAPHTHA, PARAFFIN, PETROLEUM), which is restricted to the series of neutral bodies formed naturally within animal or vegetable organisms. These bodies are divided into two well-defined groups—the fixed oils and fats, and the essential or volatile oils.

The fixed or fatty oils, although varying considerably in external appearance, form in reality a well-defined and homogeneous group of substances having great similarity of chemical composition. They appear to be essential constituents of the most highly-organized forms of animal and vegetable life, being found in plants chiefly in the seed, and in animals chiefly inclosed in the cellular tissue and in special body cavities, but the same proportion of fatty matter is found in almost all tissues and organs. Although oils and fats are universally distributed and perform most important functions in animal and vegetable life, those used for technical purposes are not drawn from any very great number of sources; and many bodies might be utilized for the production of oil which at present are not so employed.

As found in commerce, oils possess a faint characteristic taste, a slight odor, and some amount of color, generally brownish yellow. These characteristics, however, are due to certain impurities; in a really pure condition most oils have scarcely any characteristic taste, odor, color, or physiological influence. In a few cases only they have special properties which appear to be inseparable characteristics, such as the purgative principle of castor oil, croton oil, and some others. At the ordinary temperatures most vegetable oils are fluid, but a few, produced especially by tropical plants, such as palm oil, cocoa butter, Chinese tallow, etc., are solid fats. Animal fats are for the most part solid, the oils of marine animals and neatsfoot oil being important exceptions. The various solid fats differ greatly in consistency, and the hardness of individual samples is largely affected by the nature of the food and by the health of the animal yielding them, and by some other circumstances. The relative fluidity or solidity of the various oils and fats depends on the proportions of the three principal constituents of all oils—olein, stearin, and palmitin. The fluid oils contain olein in larger proportion, that body being itself liquid at ordinary temperatures, while solid stearin and palmitin predominate in the hard fats. The viscosity of the fluid oils also ranges between wide limits. The rate of flow of an oil, which is a matter of considerable importance in several industrial applications, is estimated by comparison with the standard rate at which water of the same temperature flows through an aperture of fixed dimensions. The most viscid of the fluid oils is castor oil, which at a temperature of 15° C. is more than two hundred times thicker or more slow-flowing than water. Olive

oil at the same temperature is more than twenty times thicker, and linseed and hemp oils, though among the most limpid of fixed oils, still flow about ten times as slowly as water.

Oils communicate to paper and like substances a stain which remains an irremovable translucent grease spot. They are almost entirely insoluble in water, and, excepting croton and castor oils, in cold alcohol, but in boiling alcohol they dissolve more freely, and they are perfectly soluble in ether, bisulphide of carbon, chloroform, benzol, and light petroleum spirit. In their pure condition they are neutral bodies, but, on their becoming rancid, free fatty acids are developed which give them an acid reaction. Exposed to the air they absorb oxygen freely, and the class containing linoleic acid, known as drying oils, of which linseed oil is the type, thereby harden into a solid, translucent, semi-elastic, caoutchouc-like body, a property of the utmost value in the arts. When they are exposed in thin layers over a great surface the absorption of oxygen proceeds with such energy that heat is evolved sufficient to produce spontaneous combustion, a circumstance frequently exemplified in the heating and igniting of heaps of oily cotton waste. The non-drying oils also on exposure to air thicken and become greasy; they acquire the peculiar disagreeable smell and acrid taste known as rancidity, owing to a kind of fermentation being set up in them through the agency of impurities, whereby the fixed fatty acids they contain are decomposed, and odorous volatile fatty acids formed by oxidation at their expense.

The specific gravity of all oils is lower than that of water, ranging from .900 in the case of cocoa butter to .970, the specific gravity of castor oil. Most fluid oils have a specific gravity between .915 and .930. The specific gravity of oils varies with the temperature far more than is the case with water.

When a solid fat is heated slowly till it melts and is allowed gradually to cool, it remains fluid till it falls considerably under the temperature at which it melted, and at the moment of solidification there is a sensible increase in its temperature. Butter, for example, melts at 30° to 31.5° C., but does not resolidify till it falls to 19° or 20° C.

Oils and fats are compounds of carbon, hydrogen, and oxygen, in proportions ranging, as a rule, for carbon between 76 and 80 per cent., hydrogen from 11 to 13 per cent., and oxygen from 10 to 12 per cent.

The phenomena of saponification, as exemplified on a great scale in the important industry of soap-making, furnished the key for discovering the intimate constitution of oils. Oils and fats treated with alkalis, alkaline earths, and basic metallic oxides in presence of water undergo decomposition and enter new combinations. A soap is formed by the union of the alkaline body with acid constituents of the oil, known as fatty acids, and the sweet body, glycerine, is liberated.

The ordinary method for separating vegetable oils and fats from the nuts, seeds, etc., of which they form constituent parts is by pressure, with or without the assistance of heat. They are also obtained by the agency of solvents, principally by the use of bisulphide of carbon and the light petroleum spirit benzine, these being methods of production of comparatively recent introduction. Animal oils and fats are principally isolated by simple melting or "rendering" by heat. The degrees of heat and pressure necessary for separating the several fats vary very much with the fluidity of the oils themselves, the proportion in which they are present in the substances, and the nature and consistence of the associated materials. Sperm oil is indeed obtained direct in its fluid condition from the head of the sperm whale. Virgin olive oil is obtained with the gentlest

pressure, and palm oil and several other vegetable fats and waxes are liberated by the agency of boiling water.

Pliny describes in detail the apparatus and processes used for obtaining olive oil among his Roman contemporaries, by which it appears that they derived a knowledge of the screw press from the Greeks, and applied it to the pressure of oil from pulped olives. In the East, where vegetable oil forms a most important article for food, and for other personal and domestic purposes, various ingenious applications of lever-presses and of combined lever and wedge presses have been in use from the earliest times. The Chinese employ the same series of operations which are followed in the most advanced oilmills of modern times, viz., bruising and reducing the seeds to meal under an edge-stone, heating the meal in an open pan, and pressing out the oil in a wedge-press in which the wedges are driven home by hand-hammers. The apparatus used in modern times for the extraction of oil by pressure consists of forms of the screw-press, the Dutch or stamper press, and the hydraulic press. With the screw-press, even of the most improved form, the amount of pressure practically obtainable is limited from the failure of its parts under the severe inelastic strain which can be put on it. It is on this account only used in the pressure of olives and of animal fats, where the power necessary is not great. The Dutch or stamper press, which has played an important part in the oil industry, was invented, as its name indicates, in Holland in the seventeenth century. The invention of the hydraulic press, in 1795, effected the greatest revolution in the oil industry, bringing a new, easily controlled, and almost unlimited source of power into play, and on the great scale that apparatus has practically superseded all other means of pressing.

The only method of obtaining vegetable oils which has come into practical competition with pressing is that in which the solvents bisulphide of carbon (CS_2), the light spirit of petroleum, and common ether are used. In ordinary pressing about 10 per cent. of oil remains in the finished cake, while by means of solvents practically the whole of the oil may be separated. Solvents might, therefore, be used for extracting that remaining per centage of oil-cake were such desirable, or they can be employed for treating fresh unpressed seed. As a matter of fact, it is desirable to leave a proportion of oil in the cake which is used for feeding purposes, because its food value depends to no small extent on the oil it contains, and the perfect separation of oil in the solvent process is a drawback, on account of the poverty in fatty matter of the exhausted meal.

Extraction by the agency of bisulphide of carbon was introduced in 1843 by Jesse Fisher, of Birmingham. Twelve years later a patent was secured by E. Deiss, of Brunswick, but for several years afterward the process made little advance. The color of the oil produced was high, and its taste sharp; it retained traces of sulphur, which showed themselves disagreeably in the smell of soaps made from it, and in the blackening of paints in which it was used; and the meal left by the process was so tainted with evil-smelling carbon bisulphide that cattle would not taste it. These drawbacks have now been perfectly surmounted, and the process appears likely to come into extended use on the Continent.

There is no strictly systematic plan upon which oils and fats can be satisfactorily classified and arranged. The scheme which follows brings the various commercial products into convenient groups, the distinctions of which are of prominent importance.

I. *Fluid Oils.*

- a. Non-drying or greasy oils, containing chiefly olein.
- b. Drying oils, containing linolein.
- c. Fish or train oils, containing physetolein.

II. *Fats and Waxes.*

a. Solid glycerides, principally palmitin and stearin.

b. Non-glycerides or waxes.

In a pure condition the non-drying oils undergo little change through the influence of the atmosphere, but by degrees a process of slow fermentation is set up by the agency of the natural impurities they contain, developing an offensive rancid smell, and rendering the oils thick and greasy. Even in very thin layers, however, they never dry. Under the influence of nitrous acid and mercuric nitrate the olein of non-drying oils undergoes a molecular change into elaidin, and the oil becomes solid. Castor oil, the characteristic glyceride of which is ricinolein, occupies an intermediate position between drying and non-drying oils. The influence of nitrous acid on ricinolein changes the molecular constitution of the body forming ricinclaidin, with simultaneous solidification, as in the case of olein. The drying oils are those which contain as principal constituents linolein or analogous glycerides. They absorb oxygen from the atmosphere with much rapidity, giving off at the same time carbonic acid and water, whereby the composition of the oil is modified, the proportion of oxygen much increased, and the physical properties of the oils changed. They do not solidify under the influence of nitrous acid. The fish oils do not dry on exposure to the air, but they thicken and present physical features intermediate between drying and non-drying oils.

The presence of mineral oils in any fixed oil is easily detected by the process of saponification, as well as by a peculiar fluorescence they impart to the mixture. In the saponification test the oil is made into a soap, with either soda or potash, the product mixed with sand, and the whole treated with light solvent petroleum spirit, which extracts the mineral oil. The increase in quantity of solution over the solvent used is the measure of the proportion of adulterants in the oil. Smell, taste, specific gravity, and viscosity, all to a certain extent give indications of the nature of an oil.

The essential or volatile oils constitute a very extensive class of bodies which possess in a concentrated form the odor characteristic of the plants or vegetable substances where they are obtained. The oils are usually contained in special cells, glands, cavities, or canals within the plants, either in a separate condition or intermixed with resinous substances, and in the latter case the mixtures form oleo-resins, balsams or resins, according as the product is viscid or solid and hard. A few do not exist ready formed in the plants whence they are obtained, but result from chemical change of inodorous principles—examples of this class being oil of bitter almonds and essential oil of mustard. Essential oils are for the most part insoluble, or only with difficulty and sparingly soluble, in water; but in alcohol, ether, the fatty oils, and mineral oils they dissolve freely. They ignite with great ease, and burn with a fierce smoky flame, depositing a large amount of carbon. In many important respects they differ from the fatty oils: they are not oleaginous to the touch, and make no permanent grease spot; they distill at various temperatures unchanged; they have an aromatic smell and hot burning taste; and in chemical constitution they present no relationship to the fats and oils.

Crude essential oils are at ordinary temperatures nearly all limpid liquids, but some are viscid; and the essential oil or ottar of roses is solid. Many on exposure to low temperatures separate into two portions, one solid, called "stearoptene," the other liquid, called "chæoptene." The essential oils possess high refractive power. Their influence on the plane of polarized light is various: some rotate to the right, others give left-handed rotation, while with several no effect is vis-

ible. In their fresh condition many are colorless, but some are yellow or brown, others become brown by exposure, and in exceptional instances oils are green or blue in color. They are all powerfully acted on by oxygen, which affects their color, consistency, odor, and constitution. In specific gravity they range from about 0.850 to 1.142, most of them being specifically lighter than water, and averaging 0.90. In chemical constitution the essential oils are diverse, but they are invariably rich in carbon. They consist, first and principally, of hydrocarbons, associated with which generally are, secondly, oxygenated compounds, sometimes the product of oxidation of the hydrocarbons, although in many instances there is no obvious relation between the bodies. A third class of essential oils, limited in number, consists of those into the composition of which sulphur enters.

The essential oils are obtained from their sources in four principal ways—by distillation, by expression, by enfleurage or absorption, and by maceration. The process of *distillation* is the most important, and is applicable to a large number of substances owing to the ease with which essential oils distill unchanged. The process of *expression* is applicable to the obtaining of the essential oils which reside in the rind of the orange, lemon, and other citric fruits. *Enfleurage* is a method by which the odors of several substances are dealt with. The aroma in such cases is present to a small extent, and is too tender and liable to loss and deterioration to permit of being separated by way of distillation. The process consists of exposing the flowers in contact with purified lard or with fine olive oil in suitable frames whereby the fatty substances take up and become impregnated with the essential oil. The process is principally employed in preparing pomades and perfumed oils (see PERFUMERY), as is also the analogous method of *maceration*, which consists in extracting the aromatic principles by macerating the raw materials in heated oil or molten fat, whereby the essential oils dissolve out into the fat. By subsequently digesting the impregnated fats and oils prepared either by enfleurage or maceration with spirit 60° over proof the essential oils are obtained as alcoholic essences, in which form they are much used for perfumery and flavoring purposes, etc. Alcoholic solutions of essential oils prepared by macerating the raw materials in alcohol also form a part of the tinctures of pharmacy.

Essential oils have a wide range of uses, of which the principal are their various applications in perfume. Next to that in many ways they play an important part in connection with food. The value of flavoring herbs, condiments, and spices is due in largest measure to the essential oils they contain; and, further, the commercial value of tea, coffee, wine, and other beverages is largely dependent on the delicate aroma which they owe to minute quantities of such oils. For the flavoring of liquors, of aerated beverages, and of other drinks essential oils are extensively used, and their employment is not less considerable in the manufacture of confectionery and in the preparation of many dietetic articles. In the cheaper kinds of confectionery a large quantity of artificial oils called fruit essences are now employed, although the flavors as such are distinctly crude, and the wholesomeness of the preparations is more than doubtful.

OISE, a department of northern France, three-fourths of which belonged to Île-de-France, and the rest to Picardy, is bounded on the north by Somme, on the east by Aisne, on the south by Seine-et-Marne and Seine-et-Oise, and on the west by Eure and Seine-Inférieure. Its greatest length is seventy-five miles from northwest to southeast, while its breadth from north to south

varies from thirty to forty-four miles. The department is a moderately elevated plateau with pleasant valleys and fine forests, such as those of Compiègne, Ermenonville, Chantilly, and Hallatte, all in the south. It belongs almost entirely to the basin of the Seine—the Somme and the Bresle, which flow into the English Channel, draining but a small area. The most important river is the Oise, which flows through a broad and fertile valley from northeast to southwest, past the towns of Noyon, Compiègne, Pont St. Maxence, and Creil. Although the rainfall is under the average of France, several of the valleys are, owing to their nearness to the sea and the large extent of forests, moist and marshy. The climate is very variable, but the range of temperature is moderate. The population was 404,555 in 1881.

The area of Oise is 2,260 miles, of which four-fifths are arable; one-sixth woods, and one-twentieth pasture-lands. Chantilly employs 2,000 women in making the lace for which it is famous. Beauvais, the chief town, besides its clock-making industry, has a national carpet factory, which rivals that of Gobelins at Paris. There are in the department forty-five woolen-mills with 54,000 spindles, and nine cotton-mills with 28,000; and the making of canvas, woolen fabrics, blankets, hosiery, boots and shoes, revolvers, etc., is also carried on, as well as boatbuilding. Sugar is extensively made from beetroot, and the manufactures of pottery, porcelain, and glass are also considerable. Commerce is greatly facilitated by the Oise and the Aisne, and by the lateral canal of the former. There are more than 400 miles of railway, and the roads are numerous and good. Oise contains 4 arrondissements—Beauvais, Clermont, Compiègne, Senlis—37 cantons, and 701 communes. It constitutes the diocese of Beauvais. The principal towns are Beauvais (population 17,516), Compiègne (13,567), Senlis (6,870), Clermont (5,628), Noyon (5,780), Creil (7,099), an important railway center, with earthenware manufactures, and Montataire (5,385).

OKEN, LORENZ. Under this name the great naturalist of the transcendental or deductive school is commonly known; but his real name was Lorenz Ockenfuss, under which he was baptized at Bohlsbach, Baden, being born in that small Swabian village on August 1, 1779. As Ockenfuss he was entered at the natural history and medical classes in the university of Würzburg, whence he proceeded to that of Göttingen, where he became a privat-docent, and abridged his name to Oken. As Lorenz Oken he published, in 1802, his small work entitled *Grundriss der Naturphilosophie, der Theorie der Sinne, und der darauf gegründeten Classification der Thiere*, the first of the series of works which placed him at the head of the "natur-philosophie," or physio-philosophical school of Germany. In it he extended to physical science the philosophical principles which Kant had applied to mental and moral science. One year after the production of this remarkable treatise, Oken advanced another step in the development of his system, and in a volume published in 1806, in which Kieser assisted him, entitled *Beiträge zur vergleichenden Zoölogie, Anatomie, und Physiologie*, he demonstrated that the intestines originate from the umbilical vesicle, and that this corresponds to the vitellus or yolk-bag. Caspar Friedrich Wolff had previously proved this fact in the chick, but he did not see its application as evidence of a general law. Oken showed the importance of the discovery as an illustration of his system. In the same work Oken described and recalled attention to the *corpora Wolffiana*, or "primordial kidneys," as they are now termed and recognized.

The reputation of the young privat-docent of Göttingen had meanwhile reached the ear of Goethe, and in 1807 Oken was invited to fill the office of pro-

fessor extraordinarius of the medical sciences in the university of Jena. He accepted the call, and selected for the subject of his inaugural discourse his ideas on the *Signification of the Bones of the Skull*, based upon a discovery he had made in the previous year. This famous lecture was delivered in the presence of Goethe, as privy-councilor and rector of the university, and was published in the same year. The range of Oken's lectures at Jena was a wide one, and they were highly esteemed. They embraced the subjects of natural philosophy, general natural history, zoölogy, comparative anatomy, the physiology of man, of animals, and of plants.

In 1809 Oken extended his system to the mineral world, arranging the ores, not according to the metals, but agreeably to their combinations with oxygen, acids, and sulphur. In 1810 he summed up his views on organic and inorganic natures into one compendious system.

In 1816 he commenced the publication of his well-known periodical, entitled *Isis*.

In 1821 Oken promulgated in his *Isis* the first idea of the annual general meetings of the German naturalists and medical practitioners, which happy idea was realized in the following year, when the first meeting was held at Leipsic. They have been continued ever since in Germany; and similar annual scientific gatherings have been originated in other countries. The British Association for the Advancement of Science was at the outset avowedly organized after the German or Okenian model.

In 1828 Oken resumed his original humble duties as privat-docent in the newly-established university of Munich, and soon afterward he was appointed ordinary professor in the same university. In 1832, on the proposal by the Bavarian Government to transfer him to a professorship in a provincial university of the State, he resigned his appointments and left the kingdom.

Switzerland has the honor of affording the final place of refuge, with means of an independent pursuit of science, to this philosophic and patriotic naturalist. Oken was appointed, in 1833, to the professorship of natural history in the then recently-established university of Zurich. There he continued to reside, fulfilling his professional duties and promoting the progress of his favorite sciences, until his death in the seventy-second year of his age (August 11, 1851).

OKHOTSK. See MARITIME PROVINCE.

OKLAHOMA is a tract of country lying within the geographical boundaries of the Indian Territory, recently acquired from the Indians by the general government, and thrown open for settlement on April 22, 1889, by proclamation of President Harrison.

Oklahoma is a word taken from the Choctaw language, meaning "Indian Country." By common consent it has been used to refer to the tract now thrown open for settlement.

What is known as "Oklahoma Proper" consists of three tracts of land lying mostly between the 97th and 98th degrees of longitude and between the Cherokee Strip on the north and the Chickasaw Country on the south. It is considered for all practical purposes the best farming and grazing country in the Indian Territory. It is not so well timbered as the eastern portion, requiring no clearing to secure farming lands, yet there is sufficient timber for the protection of stock and for building purposes.

Lying between the Cimarron or Red Fork of the Arkansas river on the north and the Canadian river on the south, it is made up of about eighty-seven townships, containing a total of 2,037,414 acres of unoccupied land. Almost the whole of this area is rich arable

land, composed of gently-rolling prairie, interspersed with river bottoms. A small part of it is rocky, and there are tracts of timber of considerable size. Here and there a sandy spot may be found. As a rule, the timber grows better and more plentiful as one goes east. Moving westward, the ground becomes less abundantly supplied with timber and water, and the climate is more subject to extremes of heat and cold than further east. The high prairies west of longitude $98^{\circ} 30'$ are well covered with grass, and the soil is naturally possessed of the properties necessary for crops, but the water supply is not yet sufficiently certain for dense population, and crops will not repay the settler as well as on the more eastern lands. It may be said that grass grows in sufficient abundance for stock-raising almost all over the lands ceded by the Creeks and Seminoles.

The climate of all that section of the country lying east of $98^{\circ} 30'$ west longitude is superb.

In addition to furnishing a magnificent soil, unsurpassed even by the Illinois bottoms in productiveness, and so favorably situated that it is now ready for the plow, interposing few obstacles of rock, swamp or forest, the eastern part furnishes a climate so exquisitely balanced between the long winters of the North and the long summers of the South, that almost all the products of both North and South can be successfully cultivated.

Rivers and Rainfall.—The whole Indian Territory covers 64,090 square miles, exclusive of "No Man's Land," in which the whole water surface is set down as 600 square miles. There are no very large rivers, but a large number of small streams. Nearly one-half of the water system passes through or connects with Oklahoma, thus giving it plenty of water. Average rainfall about 36 inches. About three-fourths of the land is good agricultural land, the rest is excellent grazing and timber land. There is no waste land in the whole country. It is a good cotton country, and both tropical and northern products can be raised.

The vegetation of the Territory is very much like that of northern Texas and the State of Kansas. Rich and fertile productions of all kinds abound, not only in the river bottoms, but on the uplands, prairies, and woodlands in the eastern portion of the Territory; and in the central portion large quantities of timber abound along the streams, and grass upon the prairies. A belt of forest known as the "cross timbers," from five to thirty miles in width, extends from the Arkansas river to the Brazos, separating the fertile and rich prairie lands of the central and eastern portion from the somewhat arid table-lands in the northwest. Iron and coal abound.

On the publication of the proclamation opening the country there was a great rush for favorable locations. Men who had been hovering outside its borders for days before at once pushed across the line and staked out their claims. Several towns sprang into existence as if by magic—the town of Guthrie, now one year old (1890) numbering 5,311 people, while Oklahoma City and Kingfisher follow with 4,138 and 1,133 respectively. The population of the entire territory (1890 census) is 61,834.

The Oklahoma country is not without law, although at present there is no Territorial Government, nor any such thing as county or municipal organization. By act of Congress, approved March 1, 1889, a United States Court is established whose jurisdiction extends over the entire Indian Territory. That court has exclusive original jurisdiction over all offenses against the laws of the United States committed within the Indian Territory as in such act defined, not punishable by death or imprisonment at hard labor. It also has civil jurisdiction in all cases between citizens of the United

States who are residents of the Indian Territory or between citizens of the United States or of any State or Territory therein, and any citizens, person, or persons residing or found in the Indian Territory, and, when the value of the thing in controversy, or damage, or matter claimed shall amount to \$100 or more. But the court has no jurisdiction over persons of Indian blood only. The judgment of said court, in cases where the value of the matter in dispute, exclusive of costs, exceeds \$1,000, may be reviewed and reversed, or affirmed in the Supreme Court of the United States upon writ of error, or appeal, in the same manner and under the same regulations as the final judgment and decrees of a Circuit Court.

ÖLAND, or OELAND, next to Gottland, the largest of the islands belonging to Sweden, stretches for eighty-five miles along the east coast of the southern extremity of that country, from which it is separated by the Calmar Sound, about five miles broad at the narrowest point, and not more than ten fathoms deep in the central portion. Its greatest breadth does not exceed eight or nine miles, and its area is estimated at 510 square miles. The only town is Borgholm, on the west coast, with one of the finest castle-ruins in Sweden. The town was founded only in 1817, and has not more than 800 or 900 inhabitants; but the castle, dating at least from the thirteenth century, was long one of the strongest fortresses and afterward one the most stately palaces in the country. The island, which bears the title of a countship, was joined, in 1824, to the province of Calmar. Its inhabitants, formerly styled Öningar, and showing considerable diversity of origin in the matter of speech, local customs, and physical appearance, numbered 22,820 in 1805, 37,270 in 1865, and are now (1890) 40,000.

OLAUS MAGNUS or MAGNI (Magnus, *i.e.*, Store, being the family name, and not a personal epithet) was born in 1490 and died at Rome in 1558. Like his elder brother, Johannes Magnus, he obtained several ecclesiastical preferments (a canonry at Upsala and at Linköping), and was employed on various diplomatic services; but on the success of the Reformation in Sweden his attachment to the old church led him to accompany his brother into exile. Settling at Rome, he ultimately became his brother's successor in the titular archbishopric of Upsala.

OLBERS, HEINRICH WILHELM MATTHIAS, a distinguished astronomer, was born October 11, 1758, at Arbergen, a village near Bremen, and died in 1840.

OLBIA, OLBIOPOLIS, or BORYSTHENIS, in the south of Russia, on the right bank of the Borysthenes, near its mouth, was a colony of Miletus, 655 B.C. It was the great station for the trade with the interior, and a wealthy city from a very early period.

OLDBURY, a township of Worcestershire, England, five miles west of Birmingham and three east of Dudley. Coal, iron, and limestone abound in the neighborhood, and the town possesses chemical works, railway-carriage works, iron, edge-tool, nail, and steel works, maltings, cornmills, brick and tile kilns, and a manufactory of glass shades. The population of the urban sanitary district (1,678 acres) in 1881 was 18,841.

OLDCASTLE, SIR JOHN, who had married Johanna, heiress of the noble family of Cobham, and in her right sat in the House of Lords as Lord Cobham, was a nobleman who at once enjoyed the personal friendship of Henry IV. and was a professed follower of Wycliffe and an adherent of Lollardy. His reputation both as soldier and statesman stood so high that he was selected by the king to command the English auxiliaries sent by Henry to assist the duke of Burgundy in 1411; and his

known friendship for the poor preachers and his maintenance of the popular religious cause gained him the title of "the good Lord Cobham." On the death of the earl of Salisbury in one of the revolts against the house of Lancaster, Oldcastle became the recognized leader of the Lollards; his castle of Cowling became their headquarters; he sheltered their preachers and openly defied the prohibitions and proclamations of the bishops. While Henry IV. lived Oldcastle was protected, but in the year of the king's death he was accused in convocation of heresy and of harboring the poor preachers. Henry V. did all in his power to protect him, labored to make him give up his opinions, but, finding him inflexible, forbade him to appear at court, and permitted the bishops to proceed against him. A citation was served on him. He refused to obey it, was excommunicated, seized, and was examined, when he boldly confessed his opinions, and was imprisoned in the Tower, forty days being given him to recant. He made his escape, and his freedom was the signal for a Lollard revolt. Oldcastle for some years eluded the vigilance of his enemies, but in 1417 he was seized while in hiding in Wales, taken to London, and burned.

OLD CATHOLICS, the self-assumed name of a new party in religious Christendom, which, like the Reformers of the sixteenth century, has for its avowed aim the restoration of the ancient standard of Christian belief and practice; but, while the Reformers took for their model the supposed doctrines and institutions of the apostolic age, the Old Catholics have agreed to accept the decrees of the first seven general councils (down to the second of Nicæa, 787 A.D.) as authoritative and binding on the church at large. Like the Reformation, Old Catholicism may be said to have had its representatives within the Roman Church long before its formal organization; but the immediate occasion of the movement arose out of the assembling of the œcumenical council at Rome, in 1869, by Pope Pius IX. That pontiff had previously given indications of a tendency toward a reactionary policy which contrasted strongly with the liberal measures which characterized his earlier career. Of such indications the dogma of the Immaculate Conception (December 8, 1854) and the "Syllabus" of 1864 were the most notable instances. The "Syllabus" was a formal repudiation of the chief doctrines and theories which during the preceding twenty years had been put forward by writers of various schools of thought, but representing opinions unfavorable to the teachings of Catholicism or the claims of the Papacy; and speculations which called in question the existence of a Divine Being were condemned in the same category with views inimical to the temporal power of the Roman curia. It was for the purpose of giving more emphatic recognition and sanction to the tenets of the "Syllabus" that the œcumenical council of 1869 was professedly convened, and the announcement that such a solemn expression of the convictions of the church at large was thus to be invited was hailed by the organs of the Catholic press throughout Europe with unqualified approval. Not until the council was on the eve of assembling did it become vaguely rumored that among the doctrines which would be brought forward for its acceptance and ratification was that of Papal Infallibility.

The council which assembled at Rome (December 8, 1869) was more deserving of the name of "œcumenical" than any which had ever before obeyed the behest of emperor or pope, being attended by delegates from nearly all parts of the world. It included 49 cardinals, 9 patriarchs of the Eastern communion, 4 primates, 121 archbishops, 479 bishops, and 52 abbots and other monastic dignitaries. The total number on the day of

opening was 719, increased by January 15th to 744. As a representative body it was, however, very unequally composed, the numerous holders of Italian bishoprics (many of which are of but small extent) constituting a large majority of the entire number. A proposal to rectify this practical inequality by dividing the whole council into six or eight sections representing national elements was summarily rejected. On the other hand, the superiority of the minority in learning and reputation was obvious. It included such names as Schwarzenberg, Mathieu, Darboy, Rauscher, Simor, Ginoulhiac, MacHale, Dupanloup, Ketteler, Strossmayer, Clifford, Kenrick, Maret and Hefele; while in the long list of those who eventually recorded their placets in favor of the new decree scarcely a name of real eminence appears. Doctor Döllinger, the foremost scholar of Catholic Germany, was not among the "fathers" of the council, but his disapproval of the new dogma was notorious, as also was that of the Comte de Montalembert in France. After protracted sittings, extending over seven months, and characterized mainly by a series of discreditable maneuvers to break the firm phalanx of the minority, who could only record their protests and utter eloquent remonstrances, the *Constitutio* (as it was termed) was finally laid before the council, and carried with eighty-eight dissentients, while ninety-one abstained from recording any vote. The supremacy of the Roman pontiff over even an œcumenical council was thus declared in terms more explicit and emphatic than had ever before been employed, while the new dogma was enunciated in the following terms:

"We teach and define * * * that the Roman pontiff, when he speaks *ex cathedra*, that is, when in discharge of his office of Pastor and Doctor of all Christians, he defines, in virtue of his supreme apostolic authority, a doctrine of faith and morals to be held by the Universal Church, is endowed with the divine assistance promised to him in Blessed Peter, with that infallibility with which our divine Redeemer willed that the church should be furnished in defining doctrine of faith or morals, and, therefore, that such definitions of the Roman pontiff are irreformable of themselves and not in virtue of the consent of the church."

When the above dogma was promulgated in its entirety (July 18, 1870) in the presence of 535 fathers, only two dissentient votes were recorded. It has since been asserted on good authority that the action of the Papal party was largely influenced by the empress of France and her advisers; and it cannot be doubted that at Rome, not less than in Paris, it was ardently hoped that this bold proclamation of Ultramontanist doctrine would have been followed by the triumph of the French arms over those of Prussia.

On March 28, 1871, Doctor Döllinger (see DÖLLINGER), in a letter of some length, set forth the reasons which compelled him also to withhold his submission alike as "a Christian, a theologian, an historical student, and a citizen." The publication of this letter was shortly followed by a sentence of excommunication pronounced against Doctor Döllinger and Professor Friedrich, and read to the different congregations from the pulpits of Munich. The professors of the university, on the other hand, had shortly before evinced their resolution of affording Doctor Döllinger all the moral support in their power by an address (April 3, 1871) in which they denounced the Vatican decrees with unsparing severity, declaring that, at the very time when the German people had "won for themselves the post of honor on the battlefield among the nations of the earth," the German bishops had stooped to the dishonoring task of "forcing consciences in the service of an unchristian tyranny, of reducing many pious and upright

men to distress and want, and of persecuting those who had but stood steadfast in their allegiance to the ancient faith." An address to the king, drawn up a few days later, received the signatures of 12,000 Catholics. In the following September the demand for another and a free council was responded to by the assembling of such a congress at Munich. It was composed of nearly 500 delegates, convened from almost all parts of the world; but the Teutonic element was now as manifestly predominant as the Latin element had been at Rome. The proceedings were presided over by Professor von Schulte, and lasted three days. Among those who took a prominent part in the deliberations were Landammann Keller, Windscheid, Döllinger, Reinkens, Maassen (professor of the canon law at Vienna), Friedrich, and Huber. The arrangements finally agreed upon were mainly provisional; but one of the resolutions plainly declared that it was desirable if possible to effect a reunion with the Oriental Greek and Russian Churches, and also to arrive at an "understanding" with the Protestant and Episcopal communions.

The approximation which took place in the same year between the Old Catholics, as they now began to be termed, and the historical little Church of Utrecht must not be left unnoticed. Doctor Döllinger, in delivering his inaugural address as rector of the university of Munich, expressed his conviction that theology had received a fresh impulse and that the religious history of Europe was entering upon a new phase.

Other circumstances contributed to invest old Catholicism with additional importance in the eyes of mere observers. It was evident that the relations between the Roman curia and the Prussian Government were becoming extremely strained. In February, 1872, appeared the first measures of the Falk ministry, having for their object the control of the influence of the clergy in the schools; and when Cardinal Henlopen presented himself at Rome in the following May, the world was startled at the refusal of Pius IX. to receive the accredited minister of the Prussian court. In September, 1872, the second congress was held at Cologne. It was attended by some 500 delegates or visitors from all parts of Europe, and the English Church was represented by the bishops of Ely and Lincoln and other distinguished members. The general scope of the proceedings was the formation of a more definite organization; and the question of reunion with other churches was again a prominent topic of discussion. Among those present was the late Dean Stanley.

In the month of May in the following year (1873) the celebrated Falk laws were enacted, whereby the articles fifteen and eighteen of the Prussian constitution were modified, so as to legalize a systematic state supervision over the education of the clergy of all denominations, and also over the appointment and dismissal of all ministers of religion. The measure, which at the time was interpreted as what Prince Bismarck afterward openly declared it to have been, viz., a direct response to the Vatican decrees, inspired the Old Catholics with a not unreasonable expectation that the moral support of the government would henceforth be enlisted on their side. On August 11th Doctor Reinkens, having been duly elected bishop of the new community, received his consecration at Rotterdam, as "missionary-bishop of Germany," at the hands of Bishop Heykamp of Deventer. The archbishop of Utrecht, on whom it would otherwise have devolved to perform the ceremony, had died somewhat suddenly a few days before, and the Ultramontanists did not scruple to interpret the event as a sign of the divine displeasure. In the meantime the extension of the movement in Switzerland had been proceeding rapidly, and it was resolved that

Constance should be elected as the center for the third congress. The proceedings occupied three days (September 12th to 14th), and were of an animated and interesting character—the intelligence that the Prussian Government had resolved on recognizing the election of Bishop Reinkens contributing not a little to inspire those who were present. English and American theologians, of widely different schools, listened to the discussions with sympathizing appreciation, and even bore a part. The unanimity which prevailed was remarkable, and not less so were the indications that the breach between the Papacy and Old Catholicism had become decisive and final. On September 20th the election of Bishop Reinkens was formally recognized by the German Government, and on October 7th he took the oath of allegiance to the king.

Since 1874 Old Catholicism has found new adherents in other lands—in Austria, in Italy, and in Mexico; but the controversial spirit which in past history has either broken up such organizations or largely impaired their efficiency has also marred the success of this movement.

In Germany, since the year 1878, the position of the Old Catholics has been one of considerable difficulty. While their representatives have abstained from any course of action which could tend to embarrass the government in its political contests, the most influential organs of that government have systematically decried the movement and have undisguisedly aimed at its complete extinction. This change of policy is mainly due to the altered relations with the papal court. The present pontiff, skillfully ignoring the original and genuine causes in which Old Catholicism took its rise, has sought to represent its leaders as actuated by revolutionary designs and aiming at the subversion of existing institutions, while the Papacy itself has been described as the chief bulwark against social democracy and nihilistic tendencies. The Prussian Government has responded by a series of concessions to the Roman Catholic clergy, while the favor once shown to the seceding party is at an end. Bishop Reinkens himself, though he still receives a salary from the state, no longer draws it under the head of expenditure for Catholic worship. In Bavaria Professor Friedrich has been constrained to transfer his services from the theological to the philosophical faculty at Munich, and the little Old Catholic congregation has been deprived of its church. Huber's valuable literary powers have been lost to the cause by his premature decease. In France the place of M. Michaud, who has been appointed professor in the university of Bern, is in some measure filled by the return of Father Hyacinthe from Geneva. Under such conditions the continued progress of the party and even its existence are obviously seriously imperiled. The death of Doctor Döllinger, in 1889, has proved a serious blow to the movement.

OLDENBURG, a grand-duchy of Germany, with an area of 2,480 square miles, consists of three widely separated portions of territory: (1) the duchy of Oldenburg, (2) the principality of Lübeck, and (3) the principality of Birkenfeld. It ranks tenth among the states of the German empire, and has one vote in the federal council and three members in the reichstag.

I. The duchy of Oldenburg, comprising fully four-fifths of the entire area and population, is bounded on the north by the German ocean, and on the other three sides by Hanover, with the exception of a small strip on the east, where it is conterminous with the territory of the free city of Bremen. It forms part of the north-western German plain defined by the Weser and the Ems, and, except on the south, where the Dammergebirge attain a height of 300 feet, it is almost entirely

flat, with a slight inclination toward the sea. The climate is temperate and humid; the mean temperature of the coldest month at the town of Oldenburg is 26° Fahr., of the warmest 66°. Storms are numerous and somewhat violent, owing to the almost entire absence of trees; and fogs and ague are prevalent in the marshlands. The chief rivers are the Hunte, flowing into the Weser, and the Hase and Leda draining into the Ems. The Weser itself forms the eastern boundary for forty-two miles, and internal navigation is greatly facilitated by a canal, passing through the heart of the duchy and connecting the Hunte and the Ems.

The industries are comparatively insignificant, though recently somewhat stimulated by the extension of the railway system and other causes. Woolen and cotton fabrics, stockings, jute, and cigars are made at Varel, Delmenhorst, and Lohne; cork-cutting is extensively practiced in some districts, and there are a few iron-foundries. Trade is relatively of more importance, chiefly owing to the proximity of Bremen. The agricultural produce of the duchy is exported to Scandinavia, Russia, England, and the United States, in return for colonial goods and manufactures. Varel, Brake, and Elsfleth are the chief commercial harbors. In 1889 the ports of the duchy owned a merchant fleet of 345 vessels of 70,000 tons, and they are entered and cleared annually by from 2,000 to 2,500 vessels with an aggregate burden of 125,000 tons. Shipbuilding and boat-building are carried on at the above-named seaports and on the tributaries of the Ems. Before 1866 Oldenburg was destitute of railways, but it is now traversed by various lines.

The principality of Lübeck, formed of the old bishopric of that name, has an area of 209 square miles, and shares in the general physical characteristics of East Holstein, within which it lies. On the northeast it extends to the Baltic Sea, and on the southwest it is bounded by the Trave. The chief rivers are the Schwartau, a tributary of the Trave, and the Schwentine, flowing northward to the Gulf of Kiel. The scenery of Lübeck is often picturesque, especially in the vicinity of the Plöner See and the Eutiner See, the most important of the small lakes with which it is dotted. Agriculture is practiced here even more extensively than in the duchy of Oldenburg, about 75 per cent. of the area being cultivated. The population is 34,973.

The principality of Birkenfeld, 194 square miles in extent, lies in the midst of the Prussian province of the Rhine, about 30 miles to the west of the Rhine at Worms and 150 miles to the south of the duchy of Oldenburg. It is a hilly district, intersected by the spurs of the Hochwald, which attain a height of over 2,000 feet; the valleys, however, are fertile and produce wine and grain in considerable abundance. About two-fifths of the surface is covered with forests. Iron-founding, cotton-spinning, and other manufactures are carried on; but the characteristic industry (having its seat in Oberstein) is the polishing of agates, of which great numbers are found within the principality (compare ONYX). Birkenfeld is traversed from end to end, a distance of about twenty-five miles, by the Nahe, which rises close to its northern frontier. The population is 38,685.

The total population of the grand-duchy of Oldenburg is 337,478, showing an increase of 1.10 per cent. per annum since the census of 1875, and an average of 136 persons to the square mile.

OLDENBURG, the capital of the grand-duchy of that name, is a quiet and pleasant-looking town, situated twenty-four miles to the west of Bremen, on the Hunte, which is navigable for river-craft up to this point. The population is 22,000.

OLDHAM, an important manufacturing town of

southeast Lancashire, England, six miles northeast of Manchester. By the Oldham canal it has water-communication with Manchester, Ashton, Stockport, and Rochdale. Although consisting chiefly of monotonous rows of workmen's houses, interspersed with numerous immense factories and workshops, Oldham has some good streets and a number of imposing public buildings. The town, which is one of the most important seats of the cotton manufacture in the world, owes its prosperity in great part to its situation on the edge of the Lancashire coalfield, where the mineral is very easily wrought. There are many valuable seams of coal in the immediate neighborhood of the town. From entries in the church registers it would appear that linens were manufactured in Oldham as early as 1630. Water-mills were introduced in 1770, and with the adoption of Arkwright's inventions the cotton industry spread with great rapidity. After the introduction of steam power the town, owing to its proximity to the coal-beds, soon assumed a leading place in the manufacture of cotton. The total number of persons engaged in the industry is over 30,000, the annual consumption of cotton being over 700,000 bales, or about one-fourth of the whole quantity of cotton imported into the United Kingdom. The principal manufactures are fustians, velvets, cords, hats, shirtings, sheetings, and nankeens. There are also large foundries and mill and cotton machinery works. Within the present century the growth of Oldham has been very rapid. In 1714 the population numbered only 1,750, which in 1801 had increased to 12,024, and in 1881 to 111,343. The population of the parliamentary borough in 1881 was 152,513.

OLDHAM, JOHN, a satirist of the Restoration period, achieved notoriety by his *Satires on the Jesuits*, published during the heat of the excitement caused by the revelations of Titus Oates and the murder of Godfrey in 1678. He was the son of a Nonconformist minister, born at Shipton, near Tedbury in Gloucestershire, in 1653, was a B.A. of Oxford (Edmund Hall), and for three years an usher in a school at Croydon. After the success of his *Satires on the Jesuits*, Oldham wrote more satires, imitations of Horace and Juvenal, and one of them, a satire on poets, setting forth bitterly their degradation, their poverty, their humiliating adulation of patrons, is often quoted as an index to the condition of men of letters in those days. He died prematurely (1683) at the age of thirty.

OLDYS, WILLIAM, a useful bibliographer, was the natural son of Doctor Oldys, chancellor of Lincoln, and was born in 1696, and died in 1761.

OLEAN, a post-village of Cattaraugus county, N. Y., on the Alleghany river, sixty-nine miles from Buffalo. It is a busy place, with some manufactures and a population of 10,000.

OLEANDER is the common name for the shrub known to botanists as *Nerium Oleander*. It is a native of the Mediterranean and Levant, and is characterized by its tall shrubby habit and its thick lance-shaped opposite leaves, which exude a milky juice when punctured. The flowers are borne in terminal clusters, and are like those of the common periwinkle (*Vinca*), but are of a rose color, rarely white, and the throat or upper edge of the tube of the corolla is occupied by outgrowths in the form of lobed and fringed petal-like scales. The hairy anthers adhere to the thickened stigma. The fruit or seed-vessel consists of two long pods, which, bursting along one edge, liberate a number of seeds, each of which is provided with a tuft of silky hairs like thistle down at the upper end. The genus belongs to the family of *Apocynaceæ*, a family that, as is usual where the juice has a milky appearance, is marked by its poisonous properties.

OLEARIUS, ADAM, a German traveler, whose true name was Oelschläger, was born at Aschersleben, near Magdeburg, in 1600, and died at Gottorp, February 22, 1671.

OLEO-MARGARINE. The process by which the French chemist Mège-Mouriès sought to convert ordinary animal fat into butter has already been described under BUTTER. The following is an account of the mode of manufacture:

Fresh fat from recently killed cattle is soaked in tepid water for one hour, then thoroughly washed with cold water, and, after having been soaked in cold water, assorted, the pieces less rich in "oil" being rejected and put aside for the manufacture of tallow. The fat thus selected is hashed up (almost minced) by machinery and melted down in water-jacketed caldrons, the water being heated by means of steam, so that the fat never becomes hotter than 124° Fahr. Through the action of this heat the fat divides into three parts, namely, shreds of membrane below, a scum of an emulsion of fat and water above, and clear oil between the two. The oil is drawn off and kept for thirty to thirty-six hours at a temperature of 85° Fahr., when a portion of the stearin and palmitin crystallizes out, while the more easily fusible components remain as a mother liquor, which is then squeezed out by hydraulic pressure. This oil, which on cooling freezes into a semi-solid fat, constitutes *oleo-margarine*. Of the oil considerable quantities are worked up into imitation butter. For this purpose it is violently churned up with milk for about twenty minutes, a little annatto being added to produce a yellow color. The emulsion is run direct on a mass of pounded ice to cause it to solidify without crystallization. After having been again churned up with fresh milk, it is kneaded to remove the excess of water, salted (in short, manipulated as genuine churned butter is), and sent out into the market.

The Congress of the United States has adopted a stringent law regulating the manufacture and sale of all kinds of artificial butter. There is an internal revenue tax of \$600 on manufacturers, \$480 on wholesale dealers, and \$48 on retail dealers, with an additional tax of two cents a pound. Every package must be duly marked, and retail dealers can only sell from the original packages.

OLERON, an island lying off the west coast of France, opposite the mouths of the Charente and Seudre, and included in the department of the Charente-Inférieure, has an area of fifty-nine square miles. It is about eighteen miles in length from northwest to southeast, and seven in extreme breadth; the width of the strait separating it from the mainland is at one point less than a mile. The greater part of the island is very fertile, but there are also some extensive salt marshes, from which a considerable quantity of salt is made. The chief products are corn, wine, fruit, and vegetables. The population of the island numbered 18,244 in 1881; that of the chief town, Château d'Oleron, on the southeast coast, was 1,727. Other towns are Saint-Georges d'Oleron (4,943) and Saint-Pierre d'Oleron (1,535). Oleron, the Uliarus Insula of Pliny, gave its name to a mediæval code of maritime laws, for the origin and history of which see SEA LAWS.

OLGA, wife of Igor, prince of Kieff, and afterward (from 945) regent for Sviatoslaf her son, was baptized at Constantinople about 955 and died about 969. She was afterward canonized in the Russian church, and is now commemorated on July 11th. (See RUSSIA.)

OLIVA, FERNAN PEREZ DE, Spanish man of letters, one of the earliest writers of didactic prose in that language, was born at Cordova about 1492, and, after studying at Salamanca, Alcalá, Paris, and Rome, was

appointed to the chair of moral philosophy at Salamanca, where he died in 1530.

OLIVARES, GASPARO DE GUZMAN, CONDE DUQUE DE, Spanish statesman, was born at Rome on January 6, 1587, where his father, Count Enrique, who afterward became viceroy successively of Sicily and Naples, was at the time ambassador to Pope Sixtus V. By his winning manners and valued, if not always very creditable, services he so ingratiated himself with the heir-apparent that the latter, on his accession as Philip IV. in 1621, forthwith made him his prime minister, conferring on him the title of Duque de San Lucar de Barameda. The expedients to which he was compelled to resort in order to raise money for his long and unsuccessful war with the Dutch and for the support of his armies in Germany and Italy raised throughout the Spanish peninsula a spirit of discontent, which came to a crisis in 1640, when Catalonia rebelled, calling in the aid of the French, and Portugal declared its independence, electing the duke of Braganza as king. All his attempts at pacification having failed, the enemies of Olivares succeeded in supplanting him in the king's favor in 1643. He was banished to Toro (Zamora), where he died in 1645.

OLIVE (*Olea europæa*), the well-known plant that yields the olive oil of commerce, belongs to a section of the natural order *Oleaceæ*, of which it has been taken as the type. The genus *Olea* includes about thirty-five species, very widely scattered, chiefly over the Old World, from the basin of the Mediterranean to South Africa and New Zealand. The wild olive, or oleaster, is a small tree or bush of rather straggling growth, with thorny branches and opposite oblong pointed leaves, dark grayish-green above, and, in the young state, hoary beneath with whitish scales; the small white flowers, with four-cleft calyx and corolla, two stamens, and bifid stigma, are borne on the last year's wood, in racemes springing from the axils of the leaves; the drupaceous fruit is small in the wild plant, and the fleshy pericarp, which gives the garden olive its economic value, is hard and comparatively thin. In the cultivated forms the tree acquires a more compact habit, the branches lose their spinous character, while the young shoots become more or less angular; the leaves are always hoary on the under-side, and are generally lanceolate in shape, though varying much in breadth and size in the different kinds. The fruit is subject to still greater alterations of form and color; usually oval or nearly globular, in some sorts it is egg-shaped, in others much elongated; while the dark hue that it commonly assumes when ripe is exchanged in many varieties for violet, green, or almost white. At present the wild olive is found in most of the countries around the Mediterranean, extending its range on the west to Portugal, and eastward to the vicinity of the Caspian, while, locally, it occurs even in Afghanistan. An undoubted native of Syria and the maritime parts of Asia Minor, its abundance in Greece and the islands of the Archipelago, and the frequent allusions to it by the earliest poets, seem to indicate that it was there also indigenous; but in localities remote from the Levant it may have escaped from cultivation, reverting more or less to its primitive type. It shows a marked preference for calcareous soils and a partiality for the sea-breeze, flourishing with especial luxuriance on the limestone slopes and crags that often form the shores of the Greek peninsula and adjacent islands.

The varieties of olive known to the modern cultivator are extremely numerous—according to some authorities, equaling or exceeding in number those of the vine. The tree in cultivation rarely exceeds thirty feet in height, and in France and Italy it is generally confined to much more

limited dimensions by frequent pruning. The wood, of a yellow or light greenish brown hue, is often finely veined with a darker tint, and, being very hard and close-grained, is valued by the cabinetmaker and ornamental turner.

Apart from occasional damage by weather or organic foes, the olive crop is somewhat precarious even with the most careful cultivation, and the large untended trees so often seen in Spain and Italy do not yield that certain income to the peasant proprietor that some authors have attributed to them; the crop from these old trees is often enormous, but they seldom bear well two years in succession, and in many instances a luxuriant harvest can only be reckoned upon every sixth or seventh season. The fruit when ripe is, by the careful grower, picked by hand and deposited in cloths or baskets for conveyance to the mill; but in many parts of Spain and Greece, and generally in Asia, the olives are beaten down by poles, or by shaking the boughs, or even allowed to drop naturally, often lying on the ground until the convenience of the owner admits of their removal; much of the inferior oil owes its bad quality to the carelessness of the proprietor of the trees. In southern Europe the olive harvest is in the winter months, continuing for several weeks; but the time varies in each country, and also with the season and the kinds cultivated. The amount of oil contained in the fruit differs much in the various sorts; the pericarp usually yields from 60 to 70 per cent.

The unripe fruit of the olive is largely used in modern as in ancient times as an article of dessert, to enhance the flavor of wine, and to renew the sensitiveness of the palate for other viands. For this purpose the fruit is picked while green, soaked for a few hours in an alkaline lye, washed well in clean water, and then placed in bottles or jars filled with brine; the Romans added *amurca* to the salt to increase the bitter flavor of the olives, and at the present day spices are sometimes used.

In modern times the olive has been spread widely over the world; and, though the Mediterranean lands that were its ancient home still yield the chief supply of the oil, the tree is now cultivated successfully in many regions unknown to its early distributors. Soon after the discovery of the American continent it was conveyed thither by the Spanish settlers. In Chili it flourishes as luxuriantly as in its native land, the trunk sometimes becoming of large girth, while oil of fair quality is yielded by the fruit. To Peru it was carried at a later date, but has not there been equally successful. Introduced into Mexico by the Jesuit missionaries of the seventeenth century, it was planted by similar agency in Upper California, where it has prospered latterly. Its cultivation has also been attempted in the southeastern States, especially in the Carolinas, Florida, and Mississippi. In the eastern hemisphere the olive has been established in many inland districts, which would have been anciently considered ill adapted for its culture. To Armenia and Persia it was known at a comparatively early period of history, and many olive-yards now exist in Upper Egypt, where the cultivation is said to be increasing. The tree has lately been introduced into Chinese agriculture, while in the present generation it promises to become an important addition to the resources of the Australian planter. In Queensland the olive has found a climate specially suited to its wants; in South Australia, near Adelaide, it also grows vigorously; and there are probably few coast districts of the vast island-continent where the tree would not flourish. It has likewise been successfully introduced into some parts of the Cape Colony.

OLIVES, MOUNT OF, or MOUNT OLIVET, is the

hill facing the Temple Mount on the east, and separated from it by the Kidron. Here our Lord sat when He delivered His great eschatological address. That the ascension took place from the summit of the Mount of Olives is not necessarily implied in Acts i. 12, and appears to be excluded by Luke xxiv. 50, for Bethany lies at the back of the hill and almost a mile from the top. But since Constantine erected the basilica of the ascension on the spot marked by a certain sacred cave the site of the ascension has been placed here and marked by a succession of churches. The present building is quite modern. Close to the chapel of the ascension is the vault of St. Pelagia, and a little way down the hill is the labyrinth of rock-hewn sepulchral chambers now called the "Tombs of the Prophets." A chapel bearing the name of 'Omar, and said to occupy the place where he encamped when Jerusalem surrendered to the Moslems, formerly stood beside the church of the ascension (Mokaddasi).

OLIVETANS, a monastic order, that of Our Lady of Monte Oliveto, following the Benedictine rule, was founded about the year 1313 by Bernardo Tolomei, of Siena (see MONACHISM).

OLMSTED, DENISON, man of science, was born at East Hartford, Conn., June 18, 1791, and became a student of Yale, where he graduated in 1813, and acted as college tutor from 1815 to 1817. In the latter year he was appointed to the chair of chemistry, mineralogy, and geology in the university of North Carolina. This chair he exchanged for that of mathematics and physics at Yale in 1825; in 1836, when this professorship was divided, he retained that of astronomy and natural philosophy. He died at New Haven, Conn., on May 13, 1859.

OLMÜTZ, the second city and the ecclesiastical metropolis of Moravia, and one of the strongest fortresses in the Austrian empire, is situated on the March, about 110 miles to the north of Vienna. Like most Slavonic towns, it contains several large squares, the chief of which is adorned with a trinity column, 115 feet high. The old university is now represented by a theological faculty attended by about 100 students. Its library formerly possessed an important collection of Slavonic works, which was carried off by the Swedes during the Thirty Years' War. There is also an industrial museum. The population is 20,176, besides which there is a garrison of about 6,000 men.

OLNEY, located in the township of the same name, is a prosperous city and capital of Richland county, Ill. It is about 115 miles from St. Louis, Mo., 31 miles from Vincennes, Ind., and 53 miles from Mattoon, Ill. It is handsomely built, containing, among other structures of note, a county courthouse, school building, and national bank, ten churches, three flouring-mills, a brass foundry, and woolen manufactory. Its railway facilities are adequate to the demands of the service, and the city supports two daily and three weekly papers. The population, 3,512 in 1880, is now (1890) quoted at 5,000.

OLONETZ, a government of northwestern Russia, extending from Lake Ladoga almost to the White Sea, is bounded on the west by Finland, on the north and east by Archangel and Vologda, and on the south by Novgorod. The area is 57,440 square miles. Its northwestern portion belongs orographically and geologically to the Finland region; it is covered with hills reaching 1,000 feet in height, and with numberless smaller ridges and hollows running from northwest to southeast. The rest of the government is a flat plateau sloping toward the marshy lowlands of the south. Numberless lakes, more than 2,000 being already laid down on the maps, still occupy the depressions of the surface, while a great many more have left evidence of

their past existence in the shape of extensive marshes. Lake Onega covers 3,765 square miles and reaches a depth of 125 fathoms. Lakes Seg, Vyg, Lache, and Vodlo cover from 140 to 480 square miles each, and their crustacean fauna shows a former connection with the Arctic Ocean. The southeastern part of Lake Ladoga belongs also to the government of Olonetz. Altogether, the area covered by lakes, marshes, and rivers reaches one-fifth of the whole surface. The rivers belong to the Baltic and White Sea basins. To the former system belong Lakes Ladoga and Onega, which are connected by the Svir and receive numerous streams; of these the Vytegra, which communicates with the Mariinsk canal system, and the Oyat, an affluent of Lake Ladoga, are important for navigation. No less than 4,000,000 cwts. of timber, firewood, stone, metal, and flour are annually shipped on waters belonging to this government. The Onega river, which has its source in the southeastern parts of the government and flows into the White Sea, is of minor importance. Seventy per cent. of the area of Olonetz is occupied by forests; those of the crown, maintained for shipbuilding purposes, cover more than 800,000 acres.

The climate is harsh and moist, the average yearly temperature at Petrozavodsk ($61^{\circ} 8' N.$ latitude) being 33.6° Fahr. (12° in January, 57.4° in July); the thermometer rarely falls under -30° Fahr. The population, which numbered 321,250 in 1881 (296,400 in 1873), is made up of Great Russians and Finns; Karelians and Tchudis are estimated at about 52,000 each. The people mostly belong to the Greek church, or are Nonconformists. Only 765,000 acres were under crops in 1877. More than one-fifth of the entire male population leave their homes every year in search of employment. The government is divided into seven districts, the chief towns of which are the capital, Petrozavodsk (12,000 inhabitants), Kargopol, Olonetz, Povyenets, Vytegra, and Pudozh. Olonetz includes the "Olonetz Mining District," a territory belonging to the crown, which covers 432 square miles and extends partly into the Serdobol district of Finland. The iron-works were begun by Peter I. in 1701-14. There is a population of about 60,000, who were, until 1864, serfs to the crown.

OLORON-SAINTE-MARIE, the chief town of an arrondissement in the department of Basses-Pyrénées, France, lies about twenty-one miles southwest of Pau, at the confluence of the mountain torrents (locally known as "gaves") Aspe and Ossau, which unite to form the Oloron, a tributary of the Pau. The united population of Oloron and of Sainte-Marie, on the opposite bank of the Aspe, is 7,746.

OLYBRIUS, Roman emperor from July 11 to October 23, 472, was a member of the Anician family and a native of Rome. His reign was as uneventful as it was brief. He died from natural causes.

OLYMPIA. Olympia is on the right or north bank of the Alpheus (now the Ruphia), about sixteen kilometers east in a straight line from the modern Pyrgos. The area known as Olympia is bounded on the west by the Cladeus, on the south by the Alpheus, on the north by the low heights which shut in the Alpheus valley, and on the east by the ancient racecourses.

The importance of Olympia in the history of Greece has this twofold character: it is at once religious and political. The religious associations of the place date from the prehistoric age, when, before the states of Elis and Pisa had been founded, predecessors—perhaps ancestors—of the Hellenes worshiped the "heaven-father" in this valley. The political associations may be said to date from the time when the Achæans founded Pisa, and combined the Pelasgian worship of the god Zeus with a local cult of their own ancestor, the

hero Pelops. It was then, and in honor of Pelops, that games were probably instituted for the first time at Olympia.

Long before the overthrow of Pisa the list of contests at Olympia had been so enlarged and diversified as to invest the celebration with a Panhellenic character. Exercises of a Spartan type—testing endurance and strength with an especial view to war—had almost exclusively formed the earlier programme. But as early as the twenty-fifth Olympiad, the four-horse chariot-race was added. This was an invitation to wealthy competitors from every part of the Hellenic world, and was also the recognition of a popular or spectacular element, as distinct from the skill which had a merely athletic or military interest. Horseraces were added later. For such contests the *hippodrome* was set apart. Meanwhile the list of contests on the old race course, the *stadion*, had been enlarged. Besides the footrace in which the course was traversed once only, there were now the *diaulos* or double course, and the "long" footrace (*dolichos*). Wrestling and boxing were combined in the *pancratium*. Leaping, quoit-throwing, javelin-throwing, running, and wrestling were combined in the *pentathlon*.

After the conquest of Messenia Spartan ambition had turned toward Arcadia. The aim of the Spartans was nothing less than the subjugation of the entire Peloponnesus. But the decided check which the aggressors experienced in their new attempt produced a change of design. It became evident that a policy of forcible annexation could be pushed no further. Yet Sparta might at least aspire to the hegemony of the peninsula. The other states of the Peloponnesus, while remaining independent, might be virtually under Spartan control. And for the establishment of such a hegemony what agency could be more suitable than that of Olympia? In the Olympian amphictyony, Sparta, closely allied with Elis, already held a commanding position. The rising popularity of the festival was constantly tending to make Olympia the religious and social center of Peloponnesian life—indeed, in some sense, of the Hellenic world. As the Eleans, therefore, were now the religious supervisors of Olympia, so the Spartans aimed at constituting themselves its political protectors. Their military strength—greatly superior at the time to that of any single Hellenic state—readily enabled them to do this in the most effectual manner. Spartan arms could enforce the sanction which the Olympian Zeus gave to the oaths of the amphictyones, whose federal bond was symbolized by common worship at his shrine. Spartan arms could punish any violation of that "sacred truce" which was indispensable if Hellenes from all cities were to have peaceable access to the Olympian festival. And in the eyes of all Dorians the assured dignity thus added to Olympia would be enhanced by the fact that the protectors were the Spartan Heraclidæ.

Thus, under the permanent guarantee of the strongest military power, and at the same time under the auspices which, for a large part of the Greek world, were the most illustrious possible, Olympia entered on a new phase of brilliant and secure existence as a recognized Panhellenic institution. This phase may be considered as beginning after the destruction of Pisa, about 570 B.C. And so it continued to be to the last. While the details of the scene and of the festival were the subjects of endless modification or change, Olympia always remained a central expression of the Greek ideas that the body of man has a glory as well as his intellect and spirit, that body and mind should alike be disciplined, and that it is by the harmonious discipline of both that men best honor Zeus. The significance of Olympia was larger and higher than the political

fortunes of the Greeks who met there, and it survived the overthrow of Greek independence. In the Macedonian and Roman ages the temples and contests of Olympia still interpreted the ideal at which free Greece had aimed.

OLYMPIA, for many years the capital of the Territory of Washington, and now the capital of the State (pending a permanent settlement) is situated in Thurston county, on a peninsula at the southern extremity of Puget Sound. It is a thriving city of 4,696 inhabitants, possesses first-class railroad facilities, and has an extensive coastal trade by steamers to points on the Sound. There are thirty-four manufacturing establishments, with an invested capital of \$265,000 and an annual production of \$900,000. Water power is plentiful and is utilized in flour-mills. The city is lighted by gas and electricity, there is an electric street railroad five miles long and another in course of construction, a new water system has been completed at a cost of \$110,000, and a sewerage system is being constructed. The assessed valuation of the city in 1890 was \$2,366,770. Olympia is well supplied with churches and schools, colleges and public libraries.

OLYMPIAS, the ambitious and energetic wife of Philip II., king of Macedonia, and the mother of Alexander III., commonly called The Great, was daughter of Neoptolemus I., king of Epirus, who claimed to be descended from Pyrrhus, son of Achilles. After the death of her son for a short period Olympias was mistress of Macedonia. Cassander, Antipater's son, speedily, however, returned from the Peloponnesus, and, after an obstinate siege, compelled the surrender of Pydna, where she had taken refuge. One of the terms of the capitulation had been that her life should be spared; but this did not protect her against trial for numerous and cruel executions (including that of Nicanor, Cassander's brother) of which she had been guilty during her short lease of power. Condemned without a hearing, she was put to death tumultuously by the friends of those whom she had slain, and Cassander is said to have denied her remains the rites of burial (316).

OLYMPUS, the name of many mountains in Greece and Asia Minor, and of the fabled home of the gods, and also a city name and a personal name.

Of the mountains bearing the name the most famous is the lofty ridge on the borders of Thessaly and Macedonia. The highest peak of Olympus is over 9,000 feet high; it is covered with snow for a great part of the year.

The peak of Mount Lycæus in the southwest of Arcadia was called Olympus. East of Olympia, on the north bank of the Alpheus, was a hill bearing this name; beside Sellasia in Laconia another. The name was even commoner in Asia Minor. In the elaborate mythology of Greek literature Olympus was the common home of the multitude of gods. Each deity had his special haunts, but all had a residence at the court of Zeus on Olympus; here were held the assemblies and the common feast of the gods. There was a city in Lycia named Olympus; it was a bishopric in the Byzantine time. A semi-historical musician, named Olympus, was connected with the development of flute music about 700 B.C.

OLYNTHUS was an important city of Chalcidice, situated in a fertile plain at the head of the Toronaic gulf between the peninsulas of Sithonia and Pallene, at some little distance from the sea, and about sixty stadia from Potidæa. After a long siege the city was captured by treachery in 347 B.C.; it was razed to the ground and the people sold as slaves.

OMAHA, a city of Nebraska, the largest city in the State, is situated in Douglas county, on the west bank of the Missouri, 600 miles above St. Louis. The town was founded in 1854, and in 1855 it was selected as the capital of Nebraska Territory. It lies along the river shore, partly on the bluffs and partly on bottom lands, being thus divided into two portions—a business and a residence portion. The growth of Omaha in the last few years has been something phenomenal—so much so, in fact, that the name "the Magic City" has been applied to it by its people. In 1870 the place was a mere village, having nothing in common with the splendid city of to-day save the name. Ten years later it had about 30,000 people; and at that time began its career of astounding growth. In the ten years between 1880 and the present the city has more than quadrupled in population, while its wealth and importance have far outstripped these proportions. The factors entering into and causing this growth are many, and it would seem strange if a city situated as Omaha is did not grow. In the midst of the finest agricultural region of the country, the solid growth of the surrounding community which empties its riches into the lap of Omaha gives a guarantee that the prosperity of the city will not be reactionary, and that it is not merely an evanescent boom that has been pushing the city to the front only to leave it dull and dead when it has spent its novel force. The establishment of the stockyards and the enormous packing-houses at this point had a great influence also in stimulating the growth of the city—in fact, causing a foundation of a suburb of 15,000 inhabitants—South Omaha. This portion of the city claims to be third in the world in the meat-packing industry, yielding precedence to Chicago and Kansas City only. Omaha does not draw its wealth from Nebraska alone, but from the entire group of States contiguous, the largest wheat and corn producing States in the Union being included among the number. As an example of the immense agricultural product handled, it is said that the corn crop of Nebraska alone will this year reach nearly 200,000,000 bushels, while the total cereal output of the State will increase these figures by 50,000,000 more, in addition to which we are to take into account 12,000,000 bushels of potatoes, 225,000 tons of millet, 15,000 tons of broomcorn, etc. When it is reflected that all of this product which leaves the soil which produced it is handled in Omaha, it is plain that the city must prosper. Its facilities for transportation are unsurpassed, its railways giving it free communication with all points on the continent.

But it is not alone on the agricultural product that Omaha depends. The city is near a rich mining country, which fact, together with its splendid railroad facilities, has caused the erection here of extensive refining and smelting works—the largest establishment of the kind in the world being situated here. The annual turnover of this one establishment is about \$20,000,000. There are also extensive machine and car shops, the Union Pacific shops employing 3,000 hands in busy times, and nearly always 1,500 or 2,000. Extensive distillery business is carried on, the "Willow Springs" distillery having a plant covering ten acres, and capable of turning out 15,000 gallons of spirits a day. It consumes a large amount of grain, using 500,000 bushels of corn yearly. The other manufactures comprise linseed oil, the output being 4,000 gallons a day; white lead, crackers, soap, shot, beer, boots and shoes—all these branches of industry being represented by eighty-nine manufactories, doing a yearly business of \$30,000,000, and employing about 8,000 hands. This estimate does not include the packing-houses, there being also in addition to those already mentioned the following man-

ufactories: Fifteen brickyards, one barb-wire, three carriage, two vinegar, two basket, four candy, one paper-bag, twenty-one cigar factories, and three flourmills. The jobbing trade is represented by about 300 firms. The banking facilities of the town have kept pace with its growth in other respects, there being eight national banks, with a capital of \$3,676,100, besides four savings banks and five State banks, the clearing-house showing a yearly average of \$400,000,000, with a steady increase each year. There are four first-class hotels, besides the usual number of second rates, and gradual digression to the ordinary boarding-house. The building of the million-dollar hotel is one of the projects for the immediate future. The city has an admirable water supply system, the water being taken from the Missouri river, and pumped into a reservoir 300 feet above the river and the lower town, which latter it supplies by gravity, while the upper town is supplied by direct pressure. The capacity of the works is 15,000,000 gallons daily. The railroad system of Omaha is most magnificent. The principal western lines connect this city with all points on the continent in every direction.

The principal lines centering here are the Union Pacific, the Chicago, Burlington and Quincy, the Wabash, Chicago and North-Western, Chicago and Rock Island, and Chicago, Milwaukee and St. Paul. In addition to these roads there are two belt lines which afford all facilities for transfer of freight without rehandling from one line to another. Several other roads are in contemplation, the principal purpose of which will be to open up the immense granaries of the Dakotas. These projects may be expected to take shape in the near future. The street-railway system is admirable, and the development in this regard may be said to be something wonderful. About eighty miles of railway is in operation, and new lines are being constantly added. These lines include both cable and motor lines, the old horse-cars having been superseded entirely. The growth of the city has been so rapid that it has been impossible for the march of public improvement to keep pace with the demands made on it. Notwithstanding, an enormous amount of paving, curbing, and sewers has been constructed. An idea of the rapidity with which the town is increasing may be gathered from the fact that in the past year (1888-89) the building inspector issued permits for 55 stores, 138 dwellings and stores combined, 1,336 dwellings, 3 manufactories, 14 churches, 11 public and office buildings, besides about 800 miscellaneous buildings and additions, altogether costing about \$5,000,000. The city is replete with elegant and costly structures. Space will not allow an enumeration of all. Without invidiousness may be mentioned the New York Life Insurance building, Paxton Block, City Hall, United States National Bank, Merchants' National Bank, Nebraska National Bank, First National Bank, Morse Block, Millard Hotel, the Bee Building, National Bank of Commerce, Brown Block, Ramage Block, Brownell Hall, the High School, Stock Yards Exchange, Commercial National Bank, Union National Bank, Boyd's Opera House, Pacific Express Company's building, Hotel Dellone, Woolworth Block, Trinity Cathedral, St. John's Church, Creighton College, Chamber of Commerce, the Omaha Medical and Surgical Institute, and numerous other commercial, sacred, educational, and private edifices. A new postoffice, costing over \$1,000,000, is soon to be erected, the appropriations having already been made by congress.

The city is patrolled by an efficient police, and the fire department is well organized and equipped. The sanitary conditions obtaining are so excellent that the death-rate is claimed by its health officers to average the ex-

tremely low rate of 1 per cent. This is attributed to the excellent drainage and the excellence of the water-supply. The muddy appearance of the Missouri River does not seem to affect its healthfulness, and it is claimed that its water is among the purest from all sources of supply in the world.

Real estate in and around Omaha has rapidly appreciated in value in the past few years, and the transactions of the Real Estate Exchange are quite a feature of the business of the city. When the rise first set in, it was feared by some that it was only the incipience of a temporary "boom," but the coëqual progression of the surrounding country has shown that it is solid appreciation of values, brought about by a centralization of business in this particular locality, and not a "boom," liable to subside as suddenly as it began.

The public schools of the city are numerous and they are well sustained. They are 43 in number, and are taught by over 300 teachers, having an attendance of 12,500. The cost of maintenance was \$476,559.48 for the year 1889. This expense is largely defrayed by the high liquor license. The salaries paid by the city to teachers are among the highest of any city in the Union, ranging from a minimum of \$500 to a maximum of \$2,600 yearly. The high school has reached a state of superlative excellence. In addition to the splendid public school system there are several high-grade denominational educational institutions, the principal among these being Creighton College (Jesuit), St. Catherine's Academy, the Academy of the Sacred Heart (both Catholic), and Brownell Hall (Episcopal). In the matter of churches Omaha is well supplied, almost every denomination being represented, and having one or more places of worship. There are 20,000 books in the public library, and the institution is well sustained, about one-fifth of the books circulating each month. Omaha is fully up to the remainder of the State in point of education, Nebraska holding first place in last census in respect of ability of her people to read and write. Besides the public general library there are several other smaller special libraries. The park system of Omaha is as yet in its infancy, its possessions of this kind being confined to Hanscom Park and Jefferson Square. The city has six daily newspapers, besides several others published at longer intervals.

The receipts of cattle, sheep and hogs for the year 1888-89 at the stock-yards were as follows: Cattle, 340,469; sheep, 158,503; hogs, 1,283,000.

The financial condition of the city is seen by the following table: Receipts, \$2,062,519; disbursements, \$1,949,688; bonded debt, \$1,458,550. Census population (1890), 140,452.

OMAN, or 'OMÁN. See ARABIA.

'OMAR. See MOHAMMEDANISM.

'OMAR KHAYYÁM. The great Persian mathematician, astronomer, freethinker, and epigrammatist, Ghiyáthuddín Abulfath 'Omar bin Ibráhím al-Khayyámí, who derived the cpithet Khayyám (the tentmaker) most likely from his father's trade, was born in or close by Níshápúr, and is stated to have died there in 517 A.H., (1123 A.D.)

OMAYYADS. See MOHAMMEDANISM.

OMEN. See AUGURS, DIVINATION, and MAGIC.

OMSK, the chief town of the government of Akmolinsk and capital of western Siberia, stands at the junction of the Om with the Irtysh, on the great highway of Siberia, 1,795 miles east of Moscow. The population, which is entirely Russian, numbers about 31,000, of whom about 5,000 are military.

ON, or HELIOPOLIS. See EGYPT.

ONEGA, next to Ladoga the largest lake in Europe, having, according to Strelbitskiy, an area of 3,763 square

miles, is situated in the heart of the government of Olonetz, in European Russia, and, discharging its waters by the Svir into Lake Ladoga, belongs to the system of the Neva.

ONEIDA COMMUNITY, in Madison county, N. Y., is a society which has attracted much interest on account of its pecuniary success and its peculiar religious and social principles. Its founder, organizer, and controlling mind was John H. Noyes, who, in 1834, while a student and licentiate of the theological seminary of Yale College, was led by his study of the New Testament to believe that the gospel of Christ, when fully accepted, secures present salvation from sin, and that the second coming of Christ, instead of being a future event, took place, according to promise, within a single generation of His first coming. Other religious doctrines at variance with popular theology were developed by Mr. Noyes, such as that God is a dual being, Father and Son; that God is in no sense responsible for the existence of evil, but that the author of evil, as the author of good, was uncreated; that, the second coming of Christ being past, we are now living in a new dispensation of grace; that personal spiritual communication with Christ and His risen church is possible, and when perfected secures salvation from all evil, including disease and death itself.

These doctrines found their practical expression in a social system of pure communism. In the Oneida Community, founded in 1848, "not one said that aught of the things which he possessed was his own, but they had all things in common." The Community was a large family or brotherhood, numbering at one time over three hundred members, the common bond being paramount. The children were regarded as belonging primarily to the Community; and it was a favorite theory, which they made some attempts to realize, that children should be begotten and reared only under the best conditions. So far as their experiments in this direction extended, the results, they claimed, justified their theories.

Radical as its theories and practices were, the Oneida Community was able to conduct its experiment with much success for thirty years. About that time public opinion, aroused by the clergy of the surrounding region, demanded that its social practices should be abandoned; and this was accordingly done in 1879, under the counsel of its founder and president, Mr. Noyes, who had many times previously expressed his willingness to conform to the wishes of the public respecting the practical assertion of his social principles. This important change led to other changes in the society, including the introduction of marriage and family life; and in 1880 communism of property gave place to joint-stock, and the Community was legally incorporated as the Oneida Community, Limited. Each member now has a separate individual interest represented by shares of stock, in place of the undivided interest he formerly had in the common property.

The Oneida Community, Limited, owns water-powers and factories at Wallingford, Conn., and Niagara Falls, N. Y., as well as at Community, N. Y.; but its business is principally carried on at the two places last named. At Wallingford there existed, previous to the reorganization, a branch community, varying from thirty to sixty members, and having a common interest in the parent society—both men and means being transferred from one society to the other as occasion required. Population of the community (1890), 5,500.

ONEIZA, or ANEYSA, a town in the Nefúd or sand country of Al-Kasím and, after Riád, the most considerable place in Nejd or highland Arabia, appears to

have been founded about 500 years ago, near the now ruined village of Jennah (settled some centuries before by colonists of the Baní Khálid).

ONEONTA, a New York town, in a township of the same name in Otsego county, has three banks, five churches, several manufactories and machine-shops, mills, etc. It has two newspapers, railroad and telegraph connections, schools, and a population of 5,300.

ONKELOS. See TARGUM.

ONOMACRITUS was a seer, priest, and poet of Attica about 530-480 B.C. His importance lies in his connection with the religious movements in Attica during the sixth century. He had great influence on the development of the Orphic religion and mysteries; and the works of Musæus, the legendary founder of Orphism in Attica, are said to have been reduced to order by him (see ORPHEUS).

ONTARIO is the name given, under the confederation of the provinces of British North America, to what was previously known as Upper Canada. (See CANADA.) It is the wealthiest and most populous province of the Dominion. It embraces an area of over 190,000 square miles, and its population to-day (1890) is estimated at 2,200,000. The province extends from east to west nearly 1,100 miles, and from north to south 700 miles. The river Ottawa, through a considerable part of its course, forms the eastern boundary separating it from the province of Quebec. Its southern and southwestern boundaries are the Lakes Ontario, Erie, St. Clair, Huron, and Superior, with the St. Lawrence, Niagara, St. Clair, Detroit, and St. Mary rivers. The northern and western boundaries, which had remained without precise determination so long as the region beyond was the hunting-ground of the Hudson's Bay Company, were defined in 1878 by arbitrators named by the Dominion and Provincial Governments. By this award the boundary line is traced from a point determined by a line produced due north from the head of Lake Temiscaming to James Bay, along the south shore of Hudson's Bay westerly to the mouth of the Albany river, and so by the river and lakes to the head of Lake Joseph, and by Lac Seul and the English river to a point of intersection with the meridian line drawn from the northwestern angle of the Lake of the Woods on the United States boundary. The legislature of Ontario accepted this award as determining the limits, and defining the boundary line between the provinces of Ontario and Manitoba, but the Dominion Government for a time withheld its assent, though subsequently (1888) the award was ratified by a decision of the Privy Council. Though the newest of the old provinces of Canada, it has made more rapid progress than any of the others. Its settlements, extending first along the banks of the St. Lawrence and Ottawa rivers and around the shores of the great lakes, have been gradually pushing backward toward the north and west, so that now the area lying between the Ottawa and Lake Huron—that is, between 74° and 83° W. longitude, 42° and 46° N.—forms one almost solid and compact settlement, within which almost all the acquired wealth and nearly the entire population are concentrated. Besides this block of inhabited and cultivated territory, which is divided into forty-two counties, there are on its northern fringe, extending away northward to Hudson's Bay and westward to the province of Manitoba, six partially-organized districts, named as follows: Muskoka, Paray Sound, Nipissing, Algoma, Thunder Bay, and Rainy River. These new districts form the largest portion of the area of Ontario. In the organized section of the province are its chief population and wealth. The cities are eleven in number, and the incorporated towns 200. There are twelve local banks in the province,

exclusive of agencies of other institutions, with a capital of \$20,000,000. The number of incorporated loan and investment companies is fifty-five, with a subscribed capital of nearly \$75,000,000.

Geology and Minerals.—Within the province, there is known to be a great store, as well as a great variety, of mineral wealth. The want of an adequate market, and the lack of machinery and enterprise to mine the ore, have, however, hitherto stood in the way of its development. Mining industry in Ontario has also suffered from tariff disabilities. The chief minerals of the province are silver, copper, iron, building-stone and lime, mineral fertilizers, mineral paint, petroleum, and salt. Silver abounds at the upper end of Lake Superior, in the Thunder Bay district, within a radius of fifty miles of Port Arthur. Near here is Silver Islet, where the ore was dug 500 feet below Lake Superior, and produced very largely. The richest localities, at present, lie southwest of Thunder Bay, in the valley of the Whitefish river, extending from twenty to fifty miles from the great mining center of Port Arthur. Very rich deposits are met with in the Porcupine, Rabbit, and Beaver Mountains, not far from the line of the Canadian Pacific Railway, in the Thunder Bay and Rainy River districts. Gold is obtained in the same region, but the yield as yet is so uncertain as to discourage regular enterprise. Eastward, on the line, also, of the Canadian Pacific Railroad, in the Nipissing district, are great deposits of copper. The town of Sudbury, a little west of Lake Nipissing, is the chief center of this industry. Iron-mines of great extent exist also in the eastern portions of the province, and have been partially developed along the lines of the Ontario Central and the Kingston and Pembroke railways. Other extensive deposits of iron have been found in the district between Lake Superior and the Lake of the Woods. Building-stone is distributed freely over the province, though perhaps the best quarries are found in the Credit Valley, to the northwest of Toronto. Gypsum beds, of a rich character, provide an industry, in the valley of the Grand River, for the people of the county of Hal-dimand. Other mineral fertilizers are found in the eastern section of the province, in the counties of Leeds and Lanark. The seat of the salt industry is in the vicinity of Goderich, in the county of Huron. The oil regions are in the Petrolia district, in the county of Lambton. The annual production of crude oil in this section exceeds 600,000 barrels. About half this, or over 10,000,000 gallons, is refined for local consumption. There are nearly 3,000 working wells. Mica is extensively worked in the province, and there are some excellent beds of marble. Plumbago is found in large yield in the Ottawa district, together with galena, antimony, manganese, and other economic minerals. Peat-beds are numerous, and many wells of natural gas have been struck in various localities between the St. Clair River and the Georgian Bay.

Agriculture and Trade.—The oldest settled districts of the province on the shores of Lake Ontario and Erie, and on the intervening peninsula of Niagara, are favored in many respects by geographical position, soil, and climate. The fertile area stretching westward between Lake Erie and the Georgian Bay is often styled the "Garden of Canada." The settled portions include upward of 12,000,000 acres, much of which has been long cleared and brought into a high state of cultivation. Thousands of acres are planted as orchards; and the apple crop is a profitable branch of farm produce. In the still earlier settled district of Niagara, which lies between the two great lakes, the extremes alike of summer heat and winter cold are tempered by those large bodies of water. There accordingly the peach,

grape, and plum flourish; orchards of apple and pear trees cover large areas; and, as seen from Queenstown heights, the landscape looks like a garden. The vine is indigenous, and grows luxuriantly in the woods, as do all the smaller fruits.

But the energy of more recent settlers has greatly extended cultivation. Bands of pioneers, lumbermen, and free-grant settlers have carried the ax and the plow into the Muskoka, Nipissing, and other northern districts; and those regions are now accessible by steamboat and railway. The rich mineral regions of Lake Superior are also filling up with settlers. The town of Port Arthur, on Thunder Bay, is now the lake terminus of the Canadian Pacific Railway, and already numbers fully 4,000 inhabitants.

Agriculture is greatly encouraged by legislative and municipal grants for the maintenance of agricultural societies, by the valuable work accomplished at the provincial agricultural college and experimental farm at Guelph, and by a systematic effort to ascertain the agricultural status of the country, and to record its progress from year to year. In the latter work, the bureau of industries for Ontario has rendered and is currently rendering high service, under its industrious and able Toronto secretary, Mr. Archibald Blue.

According to the report for 1888 of the Bureau of Industries for the province, 22,058,279 acres were assessed, the bulk of which was in occupancy. Of this fully a half was cleared, the remainder being chiefly in woodland. Of the cleared land two-thirds were in field crops, and one-third in pasture. The area under fruit cultivation was 180,557 acres. Much of the land is well adapted for wheat, but in many places the crop has been grown too often. Barley, oats, and peas are common crops. Maize and tomatoes ripen well. The average yield of wheat and other grains is very large in Ontario, while the quality is high. The average of fall wheat raised in the province is twenty-one bushels to the acre; of spring wheat, sixteen bushels; oats, thirty seven, and barley twenty-seven bushels to the acre. Tobacco and maple sugar are profitable crops in some districts. The growth of flax is on the increase. As the soil in nearly every part of the province is admirably adapted for root crops, cattle are very largely kept, although there are no extensive grazing districts. The beef trade with England has become very extensive, and dairy-farming is largely prosecuted; especially the making of cheese, a large number of cheese factories being now established on the coöperative principle. The total value of the live stock in the province in the year 1887 was estimated at \$104,000,000. The number of animals was classified as follows:—Horses, 575,361; cattle, 1,948,264; sheep, 1,396,161; pigs, 832,817; poultry, 6,438,361. The exports for the same year were—horses, 19,081 (value \$2,350,926); cattle, 116,490 (value \$6,521,320); sheep, 443,628 (value \$1,595,340). The export of cheese for the same year, 78,000,000 pounds, valued at \$7,500,000. Honey is an important source of revenue, about 1,200,000 pounds being exported annually. There is a very large export of timber, including pines, oak, elm, hackmatack, birch, maple, walnut, and hickory. In the official returns of the exports of the different provinces some of the most valuable produce of Ontario is included in the shipments from the ports of Quebec.

The total value of the exports of the produce of the Dominion of Canada, for the fiscal year ending June 30, 1887, as given in the last published Trade and Navigation Returns, amounted to \$80,960,909. But as Montreal and Quebec are the seaports of Ontario for seven months in the year, and as there are no customs entries of goods or animals passing from one province

to the other within the Dominion, it follows that the bulk of the exports of Ontario, consisting of timber, agricultural products, and animals and their produce, sent to the British markets are shipped from the ports named and do not appear in the Canadian Customs Returns as the exports of the Province of Ontario.

The splendid natural water communications have been extensively supplemented by railways, of which there are about 6,000 miles in operation. There are very extensive sawmills at Ottawa. The manufacture of agricultural implements employs a large number of persons throughout the province, as does also that of machinery, sewing-machines, and edged tools. Among the principal other manufactures are woolen goods (especially tweeds), cottons, leather, paper, soap, and iron and hardware. According to the census returns the total capital invested in the various industries, not including agriculture but including cheese factories, was \$80,950,847, the number of hands employed 118,308, and the total value of products \$157,989,870.

Population.—The population in 1871 amounted to 1,620,851; in 1881 it had increased to 1,923,228. Of this, the population of twelve towns of upward of 5,000 inhabitants numbered, in 1871, 179,829. In 1881 the towns of a population exceeding 5,000 had increased from twelve to nineteen, with inhabitants numbering 238,964, leaving the remaining population as occupants of the small towns, rural villages, and farms. In the year 1887 an enumeration of the population of the province was made for assessment purposes, with the following results:—Population in cities, 311,379; in towns and villages, 393,956; and in townships, 1,142,542—in all, 1,847,877, exclusive of the unassessed. The number of incorporated villages, towns, and cities in the province was, in 1886, 206; of organized township municipalities, the number was 445.

The capital of the province is Toronto (population in 1890, 190,000); next in point of wealth, population, and general local advantages is the city of Hamilton (40,000); Ottawa (32,000) is the capital of the Dominion; the other large centers of population are London (25,000), Kingston, the seat of Queen's University (Presbyterian), 16,000. Next to these are Guelph, St. Catharines (on the Welland Canal), Brantford, Belleville, St. Thomas, Stratford, Chatham, Brockville, Peterborough, Port Hope, Woodstock, Galt, and Lindsay, with populations ranging from 14,000 to 6,000. Cobourg (5,700) is the seat of the Methodist University of Victoria College.

Education.—One of the most distinctive features of the province is its system of public instruction, to which special attention has been given from an early period. So early as 1797 lands were set apart for educational purposes; and there now exists a thoroughly efficient system of public schools, high schools and collegiate institutes, provincial college and university, under the administration of a minister of education as the head of this department. The annual expenditure of the province on education is in the neighborhood of \$3,500,000. This money is derived partly from local rates of assessment levied on property, partly from lands originally set apart as clergy reserves or for school purposes, and partly from an annual grant from the legislature. The number of persons of school age, that is, between five and twenty-one, was, in 1888, 615,353; the total number attending school was 495,323. Of the latter the average attendance was, in rural districts, 46 per cent.; in towns, 59 per cent., and in cities, 62 per cent. The number of public schools in the province was 5,626, and of high schools and collegiate institutes, 118. The number of public-school teachers was, in 1888, 7,796, of whom about two-thirds were females. The cost per

pupil in the public schools is \$7.75, in the high schools \$35.91, calculated on the average registered attendance. These figures include statistics of the separate schools for Roman Catholics, of which there were 238 in operation in 1888.

Higher education in Ontario is well represented by a number of universities and colleges, the chief of which center in the provincial capital. The university of Toronto, whose building was unfortunately burned recently, but is now being rebuilt, is at the head of these institutions. The other Toronto colleges are Trinity University (Episcopal), Knox College (Presbyterian), McMaster Hall (Baptist), Wycliffe College (Episcopal), St. Michael's College (Roman Catholic). All these are affiliated to the national institution—Toronto University, which prescribes the requirements in all examinations, appoints examiners, and confers degrees in the faculties of law, medicine, and arts. University College gives instruction in the departments of arts and science, and has recently had added to it the faculties of law and medicine, provision for which was contemplated by the Royal Charter of 1827. Trinity University, which is under the control of the Church of England, possesses university and degree-granting powers of its own. Upper Canada College, founded in 1829 on the model of great public schools of England, is another notable Toronto institution, which is about to become a purely residential school. The other colleges of the province are Queen's University, Kingston (Presbyterian); Victoria University, Cobourg (Methodist); Albert College, Belleville; and Woodstock College, Woodstock (Baptist). Guelph is the seat of the Provincial Agricultural College, which supplies a general education, combined with technical training in agriculture, and connected with the institution is an experimental farm.

Administration.—Ontario, like the other provinces of the Dominion, has its affairs administered by an Executive and a Legislative Assembly, forming together what is termed the Legislature or Parliament; with a Lieutenant-Governor, who is advised by a Cabinet, composed of seven members. The latter are responsible to the local legislature, or house of assembly, which consists of eighty-eight members, meets annually and is reëlected every four years. The Provincial Government has exclusive jurisdiction in questions relating to property and civil rights, education, municipal government, and all other matters of local concern, as distinguished from those of a general character which are under the control of the Dominion or Federal Government at Ottawa. The province is represented in the Federal parliament by twenty-four members in the Senate, appointed by the Crown, and by ninety-two members in the House of Commons, elected by the people.

History.—Ontario had its political birth in 1791, when, under the name of Upper Canada, it was set apart from the old province of Quebec by the constitutional act, passed in the imperial parliament in that year. Previous to that time it was a mere wilderness, in which roamed the Indian and the wild beast. Only a few French forts and trading-posts broke the silence and the wooded seclusion of the vast region. At the close of the Revolutionary War a number of loyalists took up grants in the new province and became the nucleus of its subsequent population. The first parliament was held at Newark (Niagara) in 1792, with Gen. John Graves Simcoe as lieutenant-governor. The seat of the Provincial Government was afterward removed to York, now Toronto. During the war of 1812 the province was invaded and numerous engagements took place between the provincial forces and

those of the then young republic. The province afterward became the theater of a prolonged and bitter political struggle for responsible government, which was won after a rebellion in 1837. Three years later, Upper Canada and Lower Canada formed a union, which lasted to the era of political deadlock, in 1867, when confederation took place and Ontario became a separate self-governed province of the Dominion. Since that period, it has made great strides and is today the wealthiest, most populous, and most progressive province of Canada.

ONTARIO, LAKE. See ST. LAWRENCE.

ONTENIENTE, an old town of Spain, in the province of Valencia, stands on an elevation on the right bank of the Clariano or Onteniente, a sub-tributary of the Jucar, about eleven miles south-southwest from Játiva. In 1817 the ayuntamiento had a population of 11,727.

ONTOLOGY. See METAPHYSIC.

ONYX, a variety of agate consisting of layers of variegated chalcedony, arranged in parallel bands. The colors of the successive strata vary in different stones, but in the typical onyx they are black and white. If one of the layers consists of the brown chalcedony known as "sard" or the red variety called "carnelian," the resulting stone is termed a "sardonyx."

The onyx is largely employed for ring-stones, brooches, beads, and other ornamental objects; but its chief use is as a material for *camei* and *intagli*. By taking advantage of the different tints of the strata in the stone, a skillful artist is enabled to produce effects of a very pleasing character. Among the finest examples of ancient stone-engraving which have descended to us are certain vessels in onyx, elaborately ornamented with cameo-work, such as the Cup of the Ptolemies, the Farnese Tazza, and the Mantuan or Brunswick Vase.

OPAH (*Lampris luna*), a pelagic fish of the family *Coryphænidæ* or Dolphins. It differs from the typical dolphins (*Coryphæna*) materially in the shape of its body and the structure of the ventral fins. Instead of being elongate, the body is compressed and deep (more so than in the bream), and destitute of distinct scales. A long dorsal fin, high, and pointed anteriorly, runs along nearly the whole length of the back; the caudal is strong and deeply cleft. The ventral fins are broad paddles pointed at the extremity, and composed of numerous rays. This latter characteristic is exceptional in the order of spiny-rayed fishes, but finds its explanation in the habits of the fish. A pelagic fish with so deep a body and so short a tail as those of the opah requires additional propelling power to be able to find or pursue its prey; and therefore to the ordinary function of the ventral fins, which in other fishes is confined to balancing the body in the water, has been superadded that of locomotion.

OPAL, a natural form of hydrated silica, occurring in a "porodine" condition, *i.e.*, it has apparently hardened from a gelatinous state. During consolidation it has suffered contraction unequally in different directions; and thus, though amorphous, it behaves in polarized light like a doubly-refracting body.

The beautiful variety known as *noble* or *precious opal* is remarkable for its play of iridescent colors. In the "harlequin opal" these rainbow-tints are flashed forth from small flakes, forming a kind of polychromatic mosaic, while in other kinds of opal the colors are disposed in broad bands or in irregular patches of comparatively large area. The tints vary with the angle at which the light is incident, and with the relative position of the stone and the observer, so that by moving the opal a brilliant succession of flashes of fire may be obtained. The colors are not due to the presence of

any material pigment in the mineral, but are optical effects due to certain structural peculiarities.

The noble opal, in consequence of its brilliant iridescence, is valued as an ornamental stone. It is displayed to best advantage when cut *en cabochon* or with a convex surface. Pliny relates that the rich Roman senator Nonius was proscribed by Mark Antony for the sake of a magnificent *opalus* which he possessed, a stone as large as a hazelnut, and valued at 20,000 sesterces.

OPENSHAW, a township of Lancashire, England, is situated on the Manchester and Stockport Canal, about three and one-half miles east from the Manchester exchange. The area of the township is 579 acres; population in 1871, 11,108; in 1881, 16,153.

OPERA. See DRAMA and MUSIC.

OPHICLEIDE is a brass musical instrument with keys. It belongs to that class of instruments in which the column of air is set in vibration by a trembling of the lips applied to the edge of a hemispherical cup at the extremity of the tube, called the "embouchure." The lips vibrate from the action of the breath and play the part of reeds; the degree of pressure of the embouchure determines the rapidity of their vibration, on which, concurrently with the length of the tube, depends the pitch, or relative position, of the sound produced.

The name "ophicleide" is compounded of two Greek words, *ὄφις*, serpent, and *κλειδῆς*, keys—the instrument owing, in fact, its origin to the application of keys to the serpent, a wind instrument the invention of which is generally attributed to Edme Guillaume, canon of Auxerre, somewhere about 1590. He contrived it to serve as a bass to the zinken, instruments now entirely obsolete.

OPHIR (אֹפִיר), a place famous among the Hebrews for its gold from the time of Solomon, whose Red Sea fleet, in conjunction with the Phœnicians, went to Ophir and brought thence a vast treasure of gold with precious stones and "almug" wood. It is quite plain from Gen. x. 29 that Ophir belonged to southern Arabia, from which the Phœnicians still derived gold and precious stones in the time of Ezekiel.

OPHITES. See Gnostics.

OPHTHALMOLOGY. The scientific development of the diagnosis and treatment of diseases of the eye belongs to the last hundred years.

Acute Catarrhal Conjunctivitis begins with a feeling of stiffness of the lids, and pain as if from a particle of grit in the eye. The secretion increases, is at first watery, and is afterward yellow and muco-purulent, collecting at the inner canthus and gumming the eyelids together. The conjunctiva, especially that on the lids, is reddened, and in severe cases may be so swollen as to overlap the cornea. The eye must be left uncovered, bathed occasionally with an astringent lotion, and at night some ointment should be applied to the edges of the lids. Chronic conjunctivitis may result from adhesion of the eyelids and consequent retention of the secretion, or be due to the irritation of dust.

Purulent Ophthalmia (ophthalmia of the newly born) is caused by contact of pus from a gonorrheal or leucorrheal discharge or from another eye similarly affected. The symptoms begin, from one to three days after infection, with a watery discharge, which increases rapidly in amount, and becomes yellow and purulent. The conjunctiva becomes greatly congested and swollen, bleeding readily. The lids are so stiffened with infiltration that they can hardly be separated. When they are slightly opened quantities of pus escape. There is great pain in the eye, fever, and sleeplessness.

The cornea is much endangered; it may be perforated, may slough wholly or in part, and the eyeball may be destroyed. If one eye only is affected the other must be protected. Locally the greatest cleanliness is necessary, and the discharge must be constantly removed. Once daily the conjunctiva should be touched with a strong solution of nitrate of silver, and in the interval frequently bathed with astringent solutions. Recently powdered iodoform has been much recommended as a local application.

Diphtheritic Conjunctivitis is characterized by the formation of a yellowish false membrane on the conjunctiva, which becomes thickened and almost solid from infiltration, and by great liability to sloughing of the cornea. It should be treated by the internal administration of tonics and stimulants, and by the local use of ice, antiseptic lotions, and the strictest attention to cleanliness.

Chronic Granular Conjunctivitis is a contagious disease arising from prolonged overcrowding under bad sanitary conditions. The mucous membrane of the lids becomes reddened, thickened, and studded over with small firm "granulations," like boiled sago grains. It must be persistently treated by strong astringent or caustic applications to the conjunctiva. If a case occurs in a school or in barracks it must be at once isolated.

Pterygium is a triangular thickening of the exposed part of the conjunctiva, which may or may not be vascular.

Chronic Interstitial Keratitis attacks young persons, nearly all of whom, as was first pointed out by Hutchinson, can be shown to be the subjects of hereditary syphilis. The disease affects both eyes, one generally some time before the other. It begins by the appearance of cloudy spots in the cornea, which spread until the whole cornea has a ground-glass appearance, not uniform throughout but with denser opacities here and there. The corneal surface is "steamy." Internally, minute doses of mercurials, or where there is decided struma the syrup of the iodide of iron should be given. Locally, atropine should be used to prevent iritis. As the cornea clears, some stimulant, as the dusting of fine calomel powder, may hasten the absorption of the exudation.

Phlyctenular Ophthalmia occurs in strumous or weakly children, especially after hooping-cough or measles. The patient is generally kept in bed in a dark room, and buries his head in the pillow to exclude the light. The conjunctiva is reddened generally, but spots of localized congestion are seen near little grayish or yellowish elevations on the conjunctiva, or on the cornea near its margin. These papules or pustules may succeed each other in crops for a long time. As regards treatment, the patient must have a shade or dark glasses, and be sent out of doors daily when the weather permits. Tonics and nourishing food are required. Locally, so long as the secretion is watery, atropine must be used; later, mild astringent lotions; and finally, to aid the healing of the ulcer and clearing of the residual opacities, some mercurial ointment or calomel powder should be applied.

Ulcers of the Cornea.—Ulcers occur under many forms, to which very various names have been given. All the forms have certain symptoms in common with each other and with the above disease.

The treatment of corneal ulcers varies very much with the type of disease and with its several stages. In the acute cases the eyes should be shaded, sometimes bandaged; atropine applied locally allays pain; eserine is said to act similarly by reducing tension, and is preferable where conjunctival discharge is aggravated by atropine. The weak ulcer should be touched with

a nitrate of silver solution, the senile bathed with a quinine lotion. If the inflammatory ulcer be not checked by atropine, and if hypopyon increase, tension may be diminished by incising the cornea at its margin, or through the base of the ulcer (Saemisch), or by performing iridectomy.

Abscess of Cornea may result from injury or ill-health. It begins as a yellow spot in the substance of the cornea, with some surrounding haze. It may become absorbed or burst forward and be converted into an inflammatory ulcer, or backward, giving rise to hypopyon. If hot fomentations and atropine do not check it, it must be treated surgically like the inflammatory ulcer.

Staphyloma of the Cornea is a bulging forward, in whole or in part, of the new tissue which replaces the cornea after ulceration or sloughing. When there is no irritation it may be left alone; when it is increasing an iridectomy may check its progress.

Conical Cornea occurs principally in young women whose health has been much reduced from some chronic cause. The cornea becomes thinned in the center, and is slowly bulged forward. In severe cases operation may be of some service.

Keratitis Punctata is usually secondary to some deeper-seated disease, *e.g.*, iritis, choroiditis, or sympathetic ophthalmitis. The treatment is that of the causal disease, usually iodide of potassium or a mercurial, with atropine locally.

Arcus Senilis is a whitish crescent or ring just inside the corneal margin. It is a senile change, a fatty degeneration of the corneal tissue, not necessarily accompanied by fatty degeneration elsewhere. It does not influence the healing of corneal wounds in any way.

In *Acute Iritis* the iris changes in color and its fibers lose their definition and look muddy. The pupil becomes small, irregular in outline, and sluggish or immobile when stimulated by light. There is a pink zone of congestion around the cornea (the ciliary zone). Iritis is one of the symptoms of secondary syphilis; it is caused by rheumatism, by ulcers and diffuse inflammations of cornea, by injuries to the cornea, iris, and lens, and forms part of nearly all cases of sympathetic ophthalmitis. The syphilitic form usually involves both eyes. Treatment should be intrusted alone to a competent surgeon.

Coloboma of the Iris is a congenital defect in the iris. The defect is always in the lower part, and gives the pupil a balloon shape. It may or may not be accompanied by a similar defect in the choroid and retina.

Scleritis (episcleritis) forms a low, painful swelling, of a peculiar rusty color, under the conjunctiva in the ciliary region. It lasts for months, with frequent relapses. The subjects of this disease are mostly rheumatic or anæmic women. Internally, iodide of potassium is sometimes useful. If that fail small doses of mercury should be given. Locally, atropine, blistering the temple, or massage of the swelling through the upper lid may be tried.

Irido-cyclitis, inflammation of the iris and ciliary body, is characterized by congested patches of a violet color in the ciliary region, cloudy areas in the cornea, and attacks of iritis with much plastic exudation. There is great pain and intolerance of light.

Irido-choroiditis resembles a mild attack of iritis; there is little pain or photophobia. Small deposits form on the back of the cornea (*keratitis punctata*). Recent choroiditis and sometimes opacities in the vitreous may be seen with the ophthalmoscope if the pupil be clear. The treatment consists of atropine locally, disuse of the eyes, and tonics with iodide of potassium internally; only in mild cases is a good result obtained.

The iritic exudation is generally too plastic to be absorbed.

Wounds or Diseases in the Ciliary Region are extremely liable to involve the other eye sympathetically. There are two affections of very different moment. In *sympathetic irritation* the eye is tender and irritable, cannot bear a bright light, and is easily fatigued by continued strain of the accommodation, as in reading or other close work. This condition usually yields speedily when the other eye is removed, which should be advised without hesitation. *Sympathetic inflammation* is of much more serious moment. It may begin quite insidiously, or with acute pain and intolerance of light. Once begun, it becomes an independent disease, little influenced by treatment directed to the exciting eye, and usually ending at last in irreparable blindness. The symptoms are deposits on the back of the cornea (keratitis punctata), violet-colored ciliary congestion, often great tenderness of the ciliary region, the iris muddy and in severe cases buff-colored, and with many large blood-vessels on its surface. Extensive iritic adhesions form which cannot be absorbed. The process is an irido-cyclitis or irido-choroiditis. It may be set up two months or many years after the injury; the eye is never safe.

Cataract.—Cataract is an opacity of the crystalline lens. It is due to some alteration in the structure and relationship of its fibers, as the result either of some senile change or defect of development, of local interference with its nutrition (as in glaucoma), of some general diseases such as diabetes, or of local injury to the lens or its capsule. Treatment is entirely to be left to the surgeon.

Dislocation of the Lens may arise from a blow or spontaneously. The lens may pass into the anterior or posterior chamber. If in the posterior chamber it may be invisible, but the iris will be tremulous and the refraction very hypermetropic. If the dislocation be partial the edge of the lens may be seen with the ophthalmoscope as a dark curved line. The lens generally becomes opaque. It may, and often does, cause glaucoma.

Glaucoma is a most serious disease, characterized in all its forms by increased tension of the eyeball, impairment of sight, and ultimate irremediable blindness. Its course is usually chronic, lasting sometimes many years; sometimes absolute blindness comes on in a few hours or days.

Musæ Volitantes.—The floating bodies, specks, etc., so often complained of are usually of no importance. They occur most frequently in myopic eyes. Pathological *musæ*, however, depend on the presence of opacities in the vitreous, detectable by the ophthalmoscope. They are of very various sizes and shapes, from large masses, as in recent hemorrhage, to strings, specks, knotted bodies, or finely sparkling particles (cholesterin), or as a diffuse cloud or haze obscuring the retina. From the rate at which the bodies move an opinion may be formed of the fluidity of the vitreous. Disease of the vitreous is usually secondary to disease of some of the surrounding parts, as in high degrees of myopia, in hemorrhagic and syphilitic choroiditis and retinitis, and diseases of the ciliary region. Hemorrhage is frequent after blows on or wounds of the eye.

Disseminated Choroiditis is usually a symmetrical disease, arising from acquired or inherited syphilis. There are no characteristic symptoms, but the ophthalmoscope shows in the early stage (rarely observed) yellowish patches (of exudation), over which, unless obscured by haze, the retinal vessels are seen to pass. Later, when the exudation gives place to atrophy, white patches

are seen of various sizes with masses of black pigment on or around them, distributed irregularly over the choroid.

Tubercles are sometimes deposited in the choroid, appearing as small yellow spots. Their presence may be of assistance in forming a diagnosis of tubercular disease.

Rupture of the Choroid from injury is generally seen as a long curved line of atrophy with the concavity toward the disk.

Coloboma of the choroid is a congenital defect, indicated by a large white patch of atrophy at the lower part, often embracing the disk—the surface of the sclerotic often looking uneven. It may exist independently of similar defect in the iris.

Sarcoma of the Choroid is a malignant tumor, usually pigmented, which tends to destroy the eye, to spread along the optic nerve; and to cause metastatic deposits elsewhere in the body. It causes defect of sight, and if the media are clear may be seen by the ophthalmoscope. It often causes glaucoma and cataract.

Detachment of the Retina is a separation of the retina from the choroid by an effusion of serum or of blood, or by the growth of a tumor between them. It occurs most frequently in myopia and from blows on the eye (also from dislocation of the lens and in albuminuria). The detachment varies greatly in extent; it is most usually situated at the lower part of the retina. It causes blindness on the corresponding opposite part of the visual field. With the ophthalmoscope, instead of the red appearance, a grayish reflection is seen, generally uneven on the surface, with the retinal vessels, reduced in size, and dark in color, coursing over it. The gray surface may be seen to undulate with movements of the eye.

Embolism of the Central Artery of the Retina is a plugging of this vessel by a small body, usually detached from one of the valves of a diseased heart. The eye becomes suddenly blind, and on ophthalmoscopic examination the red reflex is found to be replaced by a diffuse white mist, except at the yellow spot where a "cherry-red" spot appears; and the retinal vessels are often reduced to mere threads. After a time the haze passes off the retina, but an atrophied disk and narrowed blood-vessels are left.

Albuminuric Retinitis occurs in an advanced stage of chronic Bright's disease of the kidneys, usually when the general health has become much impaired. It is especially associated with the granular kidney, and is not seldom the first indication of this serious disease. It causes defective sight, and some of the following characteristic ophthalmoscopic appearances.

Syphilitic Retinitis is usually a symptom of the secondary stage, affecting both eyes, and producing dimness of vision and night-blindness.

Hemorrhagic Retinitis is indicated by the appearance all over the retina of small flame-shaped hemorrhages with dilated veins. It is perhaps due to gout (Hutchinson).

Hemorrhages may result from vascular degeneration. They seriously damage sight if they occur at the yellow spot.

Pigmentary Retinitis is a peculiar chronic disease affecting both eyes symmetrically. It is either congenital or begins early in life and advances gradually till it produces complete blindness. Its cause is not well known.

Glioma of the Retina is a tumor of excessive malignancy, arising in the retina and rapidly filling the eye, and spreading from the eye along the optic nerve to the brain, or through the sclerotic to the orbit. It occurs in young children.

Atrophy of the Optic Nerve is sometimes primary, *i.e.*, arises without previous neuritis. In this case the disk becomes gradually of a pale-white or pale-grayish color, its edge more than usually distinct, and the vessels may not be contracted. Primary atrophy of the optic nerve is one of the most marked symptoms of locomotor ataxia.

Amblyopia, Amaurosis, etc.—Amblyopia means defective sight; amaurosis, blindness without sufficient obvious cause. Such defective sight is not uncommon in a squinting eye, or one of a different refractive power from its fellow. *Tobacco amblyopia* occurs in adults from excessive tobacco-smoking, especially when combined with alcoholic excess. There is loss of visual acuteness, as tested by reading, of one-fifth to one tenth, and green and red blindness in the center of the field. The disk may be normal or have a muddy color.

Hemianopsia means loss of one-half of the visual field. It is generally bilateral and effects corresponding halves of the two retinae, *e.g.*, the two right halves or the two left; rarely the two inner halves or the two outer are involved. The dividing line is usually vertical, or nearly so, bending so as to avoid the fixation point. It is due to some disease of the brain, or of one optic tract. (It will be remembered that each optic tract divides at the optic commissure, and supplies one-half of each retina, the right tract going to the right halves, the left to the left.)

Night-blindness without organic change may be due to exposure to bright sunlight, sleeping in moonlight, or to scurvy. Snow-blindness is a similar condition, with congestion of the eyelids and intolerance of light.

OPIE, AMELIA, the wife of John Opie, noticed below, was the daughter of Doctor Alderson, a physician in Norwich, and was born there in 1769. In 1801 she published a novel entitled *Father and Daughter*. *Adeline Mowbray* followed in 1804, and *Simple Tales* in 1806. The death of her husband in 1807 and her return to Norwich did not slacken her industry. She published *Temper* in 1812, *Tales of Real Life* in 1813, *Valentine's Eve* in 1816, *Tales of the Heart* in 1818, and *Madeline* in 1822. Beyond a volume entitled *Detraction Displayed*, and several contributions in prose and verse to various periodicals, nothing afterward proceeded from her pen. The rest of her life was spent in traveling and the exercise of Christian benevolence. She died at Norwich in 1853.

OPIE, JOHN, historical and portrait painter, was born near Truro, England, in May, 1761. He early showed a taste for drawing, and for scholarship also, having at the age of twelve mastered Euclid and opened an evening school of arithmetic and writing. Before long he won some local reputation by portrait-painting; and in 1780 he started for London, under the patronage of Doctor Wolcot (Peter Pindar), who hoped to win credit, and still more substantial benefits, from the fame of his young protégé. Opie was introduced to the town as "The Cornish Wonder," a self-taught genius. In 1786 he exhibited his first important historical subject, the assassination of James I., and in the following year the murder of Rizzio, a work whose merit was recognized by the artist's immediate election associate of the Academy, of which he became a full member in 1788. He was employed on five subjects for Boydell's "Shakespeare Gallery;" and until his death, on April 9, 1807, his practice alternated between portraiture and historical work.

OPIZ, MARTIN. See GERMANY.

OPIUM. A narcotic drug prepared from the juice of the opium poppy, *Papaver somniferum*, L., a plant probably indigenous in the south of Europe and western Asia, but now so widely cultivated that its original hab-

itat is uncertain. The medicinal properties of the juice have been recognized from a very early period.

Opium is said to have been introduced into China, probably by the Arabs (1280-95), during the reign of Taitsu, and its use seems to have temporarily ceased in 1368. It appears to have been commonly used in that country as a medicine before the trade with India commenced. In 1757 the monopoly of opium cultivation passed into the hands of the East India Company through the victory of Clive at Plassey. Although the importation was forbidden by the Chinese emperor Keaking in 1796, and opium-smoking punished with severe penalties, which were ultimately increased to transportation and death, the trade continued and had increased during 1820-30 to 16,877 chests per annum. In 1839 a proclamation was issued threatening hostile measures if the English opium-ships serving as depots were not sent away. The demand for removal not being complied with, 20,291 chests of opium (of 149½ pounds each), valued at \$10,000,000, were destroyed by the Chinese commissioner Lin; but still the British sought to smuggle cargoes on shore, and some outrages committed on both sides led to an open war, which was ended by the treaty of Nanking in 1842 (see CHINA). From that time to the present, in spite of the remonstrances of the Chinese Government, the exportation of opium from India to China has continued. Opium is now produced in nine out of eighteen provinces of China. The comparative cheapness of the Chinese opium, the lighter duties levied upon it, and the increasing care taken in its cultivation are enabling it to compete successfully with the Indian drug even in eastern China, where, however, it has hitherto been chiefly used to mix with and cheapen the foreign article. A time is confidently anticipated by the Chinese when Indian opium will be entirely supplanted by the native drug.

Although the collection of opium is possible in all places where there is not an excessive rainfall and the climate is temperate or subtropical, the yield is smaller in temperate than in tropical regions, and the industry can only be profitably carried on where labor and land are sufficiently cheap and abundant; hence production on a large scale is limited to comparatively few countries. The varieties of poppy grown, the mode of cultivation adopted, and the character of the opium produced differ greatly, but that of Turkey may serve as an example of all. The poppy cultivated in Asia Minor is the variety *glabrum*, Boissier, distinguished by the sub-globular shape of the capsule and by the stigmata or rays at the top of the fruit being ten or twelve in number. The crop is very uncertain owing to droughts, spring frosts, and locusts, and, in order to avoid a total failure and to allow time for collecting the product, there are three sowings at intervals from October to March—the crops thus coming to perfection in succession. The petals fall in a few hours, and the capsules grow so rapidly that in a short time—generally from nine to fifteen days—the opium is fit for collection. The incisions are made by holding the capsule in the left hand and drawing a knife two-thirds around it, or spirally beyond the starting-point, great care being taken not to let the incisions penetrate to the interior lest the juice should flow inside and be lost. When as much opium has been collected as the size of the leaf will allow, another leaf is wrapped over the top of the lump, which is then placed in the shade to dry for several days. The seed, which yields 35 to 42 per cent. of oil, is worth about two-thirds of the value of the opium. The whole of the operation must, of course, be completed in the few days—five to ten—during which the capsules are capable of yielding the drug.

After inspection the opium is hermetically sealed in

tin-lined boxes containing about 150 pounds: Turkey opium is principally used in medicine on account of its purity and the large percentage of morphia that it contains, a comparatively small quantity being exported to China.

Druggist's opium includes the varieties purchased for use in medicine in European countries and the United States. It is generally of firmer consistence and rather darker color than shipping opium. The finest varieties of this kind in commerce are Beybazar, Yerli, Karahissar (including Adet, Amasia, and Akhissar opiums), "Current" Smyrna, and Angora. Ushak, Yerli, and Karahissar opiums are purchased chiefly for the American market, and the Ghéve or Ismid opium for the Continental.

Manufacturer's opium includes chicanti or low-priced qualities of all varieties, and is used only for the manufacture of morphia. Persian opium is used for this purpose when Turkey opium is dear.

The poppy grown in India is generally the same as that used in Persia, but in the Himalayas a red-flowered variety with black seeds is met with.

The opium industry in Bengal is a government monopoly, and the districts are divided into two agencies, Behar and Benares, which are under the control of officials residing respectively at Patna and Ghazipur. In 1883 463,829 acres were under poppy cultivation in the Behar agency, and 412,625 in that of Benares.

In 1865 the cultivation of opium was attempted in Virginia, and a product was obtained which yielded 4 per cent. of morphia. In 1867 Dr. H. Black grew opium in Tennessee which contained 10 per cent. of morphia. Opium produced in California in 1873 yielded $7\frac{3}{4}$ per cent. of morphia, equal to 10 per cent. in perfectly-dried opium. The expense of cultivation exceeded the returns obtained by its sale. The activity of opium is principally due to the vegetable alkaloid morphia or morphine, which opium of good quality contains to the extent of 8 to 17 per cent., the average amount being 10 per cent. Opium yielding less than this is considered of inferior grade and below the commercial standard for use in medicine. Morphia is interesting as being the first one that was discovered of the now large class of bodies known as alkaloids. Its basic nature was first pointed out in 1816 by Sertürner. It exists in opium in combination with sulphuric and meconic acids. Lactic acid has also been found in opium, but is believed to be formed in it subsequently to the collection of the drug. Besides morphia several other basic substances have been detected in different varieties of opium, but only in minute quantities, rarely amounting to 1 per cent.

Opium also contains in considerable quantity a resinoid body which is soluble in its own weight of water, but is thrown down when this solution is diluted with ten times its bulk of water; 11 per cent. of caoutchouc; a gum distinct from gum arabic; pectin; albumen; wax, consisting of palmitate and cerotate of cerotyl; and 4 to 8 per cent. of calcareous salts. Sugar has been frequently found in opium, but whether natural or added as an adulteration is not known. The amount of caoutchouc present has probably some bearing on the value of opium for smoking, since the Chinese estimate its value roughly by the "touch," *i.e.*, the rapidity or slowness with which a thread drawn out from the mass will break by its own weight.

Of the alkaloids above mentioned only three are used to any extent in medicine, *viz.*, morphia, codeia, and narcotin. Narceia has also been used in medicine in France.

Turkey opium of good quality and freed from moisture contains from 10 to 15 per cent. of morphia, and

if less than 10 per cent. be present it is probably more or less adulterated. Persian opium is very variable in this respect, when of good quality yielding from 8 to 13 per cent., while the variety met with in the form of sticks sometimes contains only 0.2 to 3 per cent. Indian opium is remarkable for the low percentage of morphia, the average yield being only 3 to 4 per cent., although samples of the kinds known as Khandesh and Garden Patna have afforded on analysis 6 to 7 per cent. Chinese opium is similar in this respect, giving, as a rule, only 3 to 7 per cent. of this alkaloid. The amount of morphia present in opium bears no relation to the preference exhibited by smokers, opium containing a large quantity of morphia being generally considered by them as inferior in quality and apt to cause headache. For use in medicine those containing a large percentage of morphia are the most esteemed. Opium of good quality for medical use should not lose more than $12\frac{1}{2}$ per cent. of water in drying, should not yield more than 8 per cent. of ash from the dried drug, and ought to afford at least 60 per cent. of matter soluble in water. It should be of somewhat tenacious consistence, yellowish brown in color, strong narcotic odor, and bitter taste. The preparation of crude opium most largely used in medicine is the tincture, commonly known as "laudanum." It is composed of one and one-half ounces of powdered opium and one pint of spirit of wine of specific gravity 0.920.

The chief value of opium is to relieve pain, to relax spasm, to allay both local and general irritation of the nervous system, and to procure sleep. Its power of diminishing secretions is taken advantage of in the cure of catarrh, bronchorrhœa, diarrhœa, and other forms of inflammation of the mucous membranes accompanied with excessive secretions, and also in diabetes. It is found of great value when conjoined with emetics in improving or stimulating the secretions of the skin. Its use is dangerous in inflammation of the brain or determination of blood to the head. The action of opium is exerted much more powerfully in proportion upon infants than upon adults, as small a dose as one drop of laudanum having proved fatal to an infant. For remedies in cases of poisoning see POISONS. Morphia differs slightly in its properties from opium. It is less stimulant, and does not produce the full diaphoretic action; it causes less headache, nausea, and constipation. When used hypodermically its action is more rapid and smaller doses are required. Codeia is used in diabetes, in coughs, etc. Narceia is considered to be purely hypnotic. Narcotin is official in the pharmacopœia of India as a tonic in general debility arising from prolonged lactation, and in convalescence from acute febrile and inflammatory diseases.

Opium, like many other poisons, produces after a time a less effect if frequently administered as a medicine, so that the dose has to be constantly increased in order to produce the same result on those who take it habitually. When it is used to relieve pain or diarrhœa, if the dose be not taken at the usual time the symptoms of the disease recur with such violence that the remedy is speedily resorted to as the only means of relief, and thus the habit is exceedingly difficult to break off. Opium-eating is chiefly practiced in Asia Minor, Persia, and India. Opinions differ widely as to the injurious effect of the habit; the weight of evidence appears, however, to indicate that it is much more deleterious than opium-smoking.

OPODELDOC, a name now applied to a liniment composed of soap, camphor, the volatile oils of rosemary and origanum, solution of ammonia, and spirit of wine. It is made of such a consistence that it is solid at ordinary temperatures, but melts with the warmth of the

hand. The origin of the name is lost in obscurity, but is believed to have been first applied to a plaster, invented by Mindererus or Paracelsus, and used for bruises and external injuries.

OPORTO (*i.e.*, *O Porto*, The Port), the second city of the kingdom of Portugal, the capital of Entre Douro e Minho, the best-cultivated and the most fruitful province of the country, is situated on both banks of the Douro, about three miles from its mouth. The part south of the Douro is known as Villa Nova da Gaia. The mouth of the river is obstructed by a very dangerous shifting sandbank, protected by a lighthouse and a castle situated in the village of São João da Foz, which, along with Campanha, Paranhos, and Sordello, completes the suburbs. The population of the city is 80,295, and with the suburbs 108,346.

The view of the town from the river is singularly attractive and quaint. It possesses many buildings of interest, and picturesque thoroughfares, which, however, from the situation of the city, are very steep and irregular. The principal edifices are the cathedral and the archbishop's palace—the latter, containing a fine staircase, conspicuously situated on a high rock—and the Torre dos Clerigos, a granite tower 210 feet high, built in 1748, commanding a splendid view, and visible at sea a long way off. The English factory (built in 1790), including a library, reading-room, and ballroom, is one of the largest buildings, while the exchange (once the monastery of S. Francisco) is perhaps the finest and most elaborately decorated structure in the country. The walls and floor of the hall are entirely covered with beautiful inlaid devices in polished native-colored woods of all hues brought from the virgin forests of the Brazils. The museum, the public library, containing over 80,000 volumes, the barracks, the Da Misericórdia Hospital, and the opera-house are the other most important public buildings. The Rua Nova dos Ingleses is the most frequented street, and the Rua das Flores is one of the most interesting from the rich display of gold-work, for which the town is famous, both in its shop windows as well as—more characteristically and attractively—on the persons of the fishwomen in their everyday garb. The Praça de San Ovidio, situated on the heights, and laid out in terraces of flowers, deserves a visit from the traveler, while the Largo da Torre da Marva is interesting as standing on the site of the ancient Cale, from which the kingdom derives its name (Porto Cale). The chapel of Cedo Feita, said to have been founded in 559 by the Visigothic king Theodoric (but much more probably not till the twelfth century), is very curious; the church of Nossa Senhora da Lapa, a well-known landmark, is a handsome Corinthian edifice. The city at one time had no less than eighty monasteries and chapels. The English community maintain a chaplain and a doctor, and have a cemetery for their own dead. Railways run from Oporto to Lisbon, and up the valley of the Douro to Pêzo da Regoa, and recently a junction has been made with the line through Spain to Paris, whereby the long journey from Lisbon to that capital *via* Madrid is vastly shortened; a branch also runs to the frontier town of Valença on the Minho. Oporto possesses good schools, a medical college with numerous chairs, and a botanical garden. Several newspapers appear daily.

The industries of Oporto are the most important and numerous in the kingdom, employing about 6,000 hands, the chief being paper; linen, wool, cotton, silk, and gold manufactures, brocade, lace, glove, button and pottery making. Oporto is chiefly famous for the export of the wine which bears its name, of which the great storehouses are on the south side of the river. The vines from which it is made grow on the Alto Douro,

a hilly and precipitous region lying about sixty miles up the river, and having an area of twenty-seven miles in length by five or six in breadth, cut off from the sea, and shut in on the northeast by a range of mountains. The trade was established in 1678, but the shipments for some years did not exceed 600 pipes (of 115 gallons each). In 1703 Lord Methven made a treaty with Portugal, under which Portuguese wines were admitted on easier terms than those of Gascony, and henceforward "port" began to be drunk. In 1747 the export reached 17,000 pipes. In 1754 the great wine monopoly company of Oporto originated, under which the shipments rose to 33,000 pipes. At the beginning of the present century the policy of the government more and more favored port wine, besides which the vintages from 1802 to 1815 were splendid both in Portugal and in Madeira—that of 1815 has, in fact, never been excelled. For the next few years the grape crop was not at all good, but the 1820 vintage was the most remarkable of any. It was singularly sweet and black, besides being equal in quality to that of 1815. This henceforth became the standard taste and color for true port, and to keep up the vintage of following years to this exceptional standard adulteration by elderberries, syrup, and *jeropiga* was resorted to. This practice did not long continue, for it was cheaper to adulterate the best wines with inferior sorts of port wine itself. There is scarcely a Portuguese wine, in skillful and intelligent hands, not capable of being made both sound and palatable without recourse to any sort of adulteration. Port is now one of the purest wines.

Besides wine Oporto exports oranges (228,000,000 in 1878), onions shipped as of Spanish growth, and varying vastly in amount, according to the season, and olives (which go to Brazil alone, although they are cheaper and finer-flavored when truly ripe than those of any other country). An important trade is done in live cattle. Portugal is one of the few countries never visited by the cattle-plague.

OPOSSUM. The animals to which this name is applied are the only non-Australian members of the Marsupials or pouched animals, being found throughout the greater part of the continent of America, from the United States to Patagonia, the number of species being largest in the more tropical parts. They form the family *Didelphyidae*, distinguished from the other Marsupial families by their equally developed hind-toes, their nailless but fully opposable hallux, and by their dentition, its formula being $i\frac{5}{4} c\frac{1}{1} pm\frac{3}{3} m\frac{4}{4}$, total 50, a number only exceeded among heterodont Mammalia by the Australian *Myrmecobius fasciatus*. Opossums are small animals, varying from the size of a mouse to that of a large cat, with long noses, ears, and tails, the latter being as a rule naked and prehensile, and with their great toes so fully opposable to the other digits as to constitute a functionally perfect posterior pair of "hands." These opposable great toes are without nail or claw, but their tips are expanded into broad flat pads, which are no doubt of the greatest use to such a climbing animal as an opossum. On the anterior limbs all the five digits are provided with long sharp claws, and the pollex or thumb is but little opposable. Their numerous teeth are covered with minute sharply-pointed cusps, with which to crush the insects on which they feed, for the opossums seem to take in South America the place in the economy of nature filled in other countries by the true *Insectivora*, the hedgehogs, moles, and shrews.

The family consists of two well-recognized genera only, viz., *Didelphys*, containing all the members of the family, with the exception of the Yapock, a curious animal which forms by itself the second genus, *Chiro-*

nectes, and is distinguished from all other opossums by its webbed feet, non-tuberculated soles, and peculiar coloration. Its ground color is light gray, with four or five sharply-contrasted brown bands passing across its head and back, giving it a very peculiar mottled appearance. It is almost wholly aquatic in its habits, living on small fish, crustaceans, and other water animals; its range extends from Guatemala to southern Brazil.

The other genus of opossums, *Didelphys*, is an extremely heterogeneous one, and has been split up into several groups, some of which perhaps ought also to be recognized as genera. The first of these consists of three or four large dull-colored long and coarse-haired species, with perfect marsupial pouches, large leafy ears, and greatly-developed muscular ridges on their skulls. The best known of these, and indeed of all the family, is the Virginian Opossum, *Didelphys virginiana*, an animal spread over all temperate North America; it is extremely common, being even found living in the towns, where it acts as a scavenger by night, retiring for shelter by day upon the roofs of the houses or into the sewers. It produces in the spring from six to sixteen young ones, which are placed by the mother in her pouch immediately after birth, and remain there until able to take care of themselves; the period of gestation is from fourteen to seventeen days. Another very similar species is found in central and tropical South America, and is known as the Crab-eating Opossum (*D. cancrivora*). The second group, or sub-genus, named *Metachirus*, contains a considerable number of species found all over the tropical parts of the New World. They are of medium size, with short, close fur, very long, scaly, and naked tails, and have less developed ridges on their skulls. They have as a rule no pouches in which to carry their young, and the latter therefore commonly ride on their mother's back, holding on by winding their prehensile tails round hers. The third group is *Micoureus* (*Grymæomys* of Burmeister), differing only from *Metachirus* by the comparatively smaller size of its members and by certain slight differences in the shape of their teeth. Its best-known species is the Murine Opossum (*D. murina*), no larger than a house-mouse, of a bright-red color, which is found as far north as central Mexico, and extends thence right down to the south of Brazil. The last sub-genus contains three or four wonderfully shrew-like species, of very small size, with short, hairy, and non-prehensile tails, not half the length of the trunk, and with wholly unridged skulls. The most striking member of the group is the Three-striped Opossum (*D. tristriata*), from Brazil, which is of a reddish-gray color, with three clearly-defined deep-black bands down its back, very much as in some of the striped mice of Africa.

OPPELN, the chief town of a district of its own name and the seat of government for Upper Silesia, Prussia, lies on the right bank of the Oder, fifty miles to the southeast of Breslau. It contains the oldest Christian church in the district, founded at the close of the tenth century, and a ducal palace of the fifteenth century, on an island in the Oder. The population in 1889 was 14,447, of whom 10,772 were Roman Catholics. The upper classes speak German, the lower Polish.

OPPENHEIM, a small town in the grand-duchy of Hesse-Darmstadt, Germany, is picturesquely situated on a hill on the left bank of the Rhine, twenty miles to the south of Mainz.

OPPIAN, the supposed author of three Greek poems on fishing, hunting, and fowling, is said to have been born or at least lived in the reign of Marcus Aurelius, 161-180 A.D. The authorship of the works ascribed to him has not been undisputed.

OPPIUS, CAIUS, was an intimate friend and confidant of Julius Cæsar. He managed the dictator's private affairs, and took no public office, but during the time when Cæsar was absent from Rome he, together with Balbus, exercised very great influence on public business. According to Suetonius, many authorities considered Oppius to have written the histories of the Spanish, African, and Alexandrian wars which are printed among the works of Cæsar. Niebuhr unhesitatingly assigns the African war to Oppius.

OPTICS, GEOMETRICAL. The subject of optics is so extensive that some subdivision of it is convenient if not necessary. Under the head of LIGHT will be found a general sketch accompanied by certain developments. The wave theory and those branches of the subject which are best expounded in connection with it are reserved for treatment in a later volume.

ORACLE. It was a universal belief in the ancient world that there is a capacity in the human mind to divine the will of God (*μαντικόν τι ἡ ψυχή*, *mantikon ti he psyche*). This capacity is not equally developed in all men, and, practically, a very few persons, in whom it is strong, are distinguished from the mass as *μάντις*, *manteis*, i.e., seer. These are able to understand the methods by which the gods reveal their intentions to men. There occur cases where the gods speak directly to men, where a divine voice is heard issuing its commands or warnings, but these instances are confined, except in a very few remarkable historical cases, to the heroic age and to epic poetry. Setting these aside, we find that the divine will was revealed to the interpreting medium in two ways—by inspiration and by signs. In the former case the divine influence overpowers the soul of the medium and takes entire possession of it for the time. The medium cannot himself bring on a revelation, but is at rare intervals affected by the power of the god, his consciousness ceases, and the god speaks through him words which he is himself unable to control or even to understand. The second method of revelation, by signs, required a distinct art of interpretation; certain events, phenomena in the heavens or in bird or animal life, the conduct of sacrificial animals and the appearance presented by their entrails, etc., presaged the will of the god to him who possessed the art of interpreting them. The second method was called *artificial* (*ἐντεχνος*), in opposition to the first, which is direct and *artless* (*ἄτεχνος*).

In every case the revelation of the divine will is dependent on the direct act of the god; he affects the soul of the *μάντις*, when and where he pleases; he sends, when he chooses, the signs from which his intentions can be inferred. There was, however, a belief that at certain places the gods gave revelations more frequently than at others. Such places were generally characterized by some marked physical feature. At these places there were established regular institutions, with a staff of priests and prophets, to which the neighbors resorted for counsel; the Latin term "oracle" (in Greek *μαντεῖα*, *χρησθήρια*) is the general name.

The common method of revelation in hero-oracles, and in the oracles of some gods, was through dreams. Hero-oracles were certainly in their earliest form simply oracles of the dead; the word *ἥρωας* (*heros*) is a generic term for a dead man. We can trace occasional survivals of the most primitive form of the hero-oracle. The person who seeks advice goes to sleep over the actual graves, and the dead man appears in a dream. In Olympia it is probable that the oracle of Gæa was the oldest institution, and it is universally recognized in ancient and modern times that the Delphic oracle originally belonged to the same goddess. Probably the cleft in the earth in the Delphic adyton was originally con-

ceived as the passage of communication between the dead under the earth and the living on its surface.

ORAN (Arabic, *Wahrán*), the chief town of the department and military division which form the western part of the French colony of Algeria, lies at the head of a bay on the Mediterranean. The population of the town in 1881 was 58,530; that of the commune, including town and suburbs, 59,377.

ORANG. See AFE.

ORANGE (*Citrus Aurantium*), the plant that produces the familiar fruit of commerce, is closely allied to the citron, lemon, and lime, all the cultivated forms of the genus *Citrus* being so nearly related that their specific demarcation must be regarded as somewhat doubtful and indefinite. Risso and Poiteau have described eighty kinds of orange (including the bergamots), chiefly differing in the external shape, size, and flavor of the fruit; but all may probably be traced to two well-marked varieties—the Sweet or China Orange and the Bitter Orange or Bigarade—though several of these modifications seem to indicate crossing with the lemon or citron, if, indeed, they do not rather point to a more remote common origin from a primitive citrine type.

The bitter orange, by some made a sub-species (*C. vulgaris*), is a rather small tree, rarely exceeding thirty feet in height. The green shoots are furnished with sharp axillary spines, and alternate evergreen oblong leaves, pointed at the extremity, and with the margins entire or very slightly serrated; they are of a bright glossy green tint, the stalks distinctly winged, and, as in the other species, articulated with the leaf. The fragrant white or pale pinkish flowers appear in the summer months, and the fruit, usually round or spheroidal, does not perfectly ripen until the following spring, so that flowers and both green and mature fruit are often found on the plant at the same time. The bitter aromatic rind of the bigarade is rough, and dotted closely over with concave oil-cells; the pulp is acid and more or less bitter in flavor. The sweet orange generally has the shoots destitute of spines, the petioles less distinctly winged, and the leaves more ovate in shape, but chiefly differs in the fruit, the pulp of which is agreeably acidulous and sweet, the rind comparatively smooth, and the oil-cells convex. The ordinary round shape of the sweet orange fruit is varied greatly in certain varieties, in some being greatly elongated, in others much flattened; while several kinds have a conical protuberance at the apex, others are deeply ribbed or furrowed, and a few are distinctly "horned" or lobed, by the partial separation of the carpels. The two sub-species of orange are said by some authorities to reproduce themselves infallibly by seed; and, where hybridizing is prevented, the seedlings of the sweet and bitter orange appear to retain respectively the more distinctive features of the parent plant; but where growing wild for successive generations they show a tendency to degenerate, the progeny of the sweet orange being apt to assume the broadly-winged petioles and spiny shoots of the bigarade.

Though now cultivated widely in most of the warmer parts of the world, and apparently in many completely naturalized, the diffusion of the orange has taken place in comparatively recent historical periods. To ancient Mediterranean agriculture it was unknown; and, though the later Greeks and Romans were familiar with the citron as an exotic fruit, their "Median Apple" appears to have been the only form of the citrine genus with which they were acquainted. The careful researches of Gallesio have proved that India was the country from which the orange spread to western Asia and eventually to Europe. The orange flourishes in any moderately

fertile soil, if it is well drained and sufficiently moist; but a rather stiff loam or calcareous marl, intermingled with some vegetable humus, is most favorable to its growth. In Florida and California grafting or budding on stocks raised from the seed of some vigorous variety is the plan usually adopted by the cultivator. The seeds, carefully selected, are sown in well-prepared ground, and the seedlings removed to a nursery-bed in the second year and grafted in the third year with the desired variety. When the grafts have acquired sufficient vigor, the trees are placed in rows in the permanent orangery. Propagation by layers is occasionally adopted; cuttings do not readily root, and multiplication directly by seed is always doubtful in result, though recommended by some authorities. The distance left between the trees in the permanent plantation or grove varies according to the size of the plants and subsequent culture adopted. Oranges intended for export to colder climates are gathered long before the deep tint that indicates maturity is attained, the fruit ripening rapidly after picking; but the delicious taste of the mature China orange is never thus acquired, and those who have not eaten the fruit in a perfectly ripe state have little idea of its flavor when in that condition. Carefully gathered, the oranges are packed in boxes, each orange being wrapped in paper, or with dry maize husks or leaves placed between them. The Americans have heretofore been largely supplied from Jamaica and the Bahamas, but the rapidly increasing and already extensive cultivation of the fruit in California and Florida is fast superseding foreign importation, most oranges on the American market being grown in these two States. In Florida the bitter orange has grown, from an unknown period, in a wild condition, and some of the earlier botanical explorers regarded it as an indigenous tree; but it was undoubtedly brought by the Spanish colonists to the West India Islands, and was probably soon afterward transplanted to Florida by them or their buccaneering enemies. The climate of Florida and California seems remarkably adapted for orange culture, and orangeries are becoming yearly more numerous and extensive—the wild stocks, or those raised from wild seed, being generally employed by the grafter. California in particular seems to be rapidly nearing first place in the production of oranges—the industry for the past year being indicated by the shipment to outside points of 450,000 boxes of the fruit. In the Gulf States this branch of agricultural industry is pursued to some extent.

Certain varieties of orange deserve mention, from the peculiar character of their fruit. The Mandarin orange of China, sometimes made a distinct species, *C. nobilis*, is remarkable for its very flat spheroidal fruit, the rind of which readily separates with the slightest pressure; the pulp has a peculiarly luscious flavor when ripe. The small Tangerine oranges, valued for their fine fragrance, are derived from the Mandarin. "Maltese" or "Blood" oranges, much grown in southern Italy, are distinguished by the deep-red tint of the pulp. The species mostly cultivated in California and Florida is the Washington navel, a luscious, juicy, prolific, hardy, seedless variety. It is claimed that these oranges are less perishable, when packed for shipment, than the fruit of other varieties. They have become great favorites with the people, superseding in public estimation all other kinds.

Besides the widespread use of the fruit as an agreeable and wholesome article of diet, that of the sweet orange, abounding in citric acid, possesses in a high degree the antiscorbutic properties that render the lemon and lime so valuable in medicine; and the free consumption of this fruit in the large towns of England during

the winter months has doubtless a very beneficial effect on the health of the people. The juice is sometimes employed as a cooling drink in fevers, as well as for making a pleasant beverage in hot weather; it is likewise an essential ingredient in "orange wine."

The bitter orange is chiefly cultivated for the aromatic and tonic qualities of the rind, which render it a valuable stomachic.

ORANGE, a city of France, the chief town of an arrondissement in the department of Vaucluse, is situated eighteen miles north of Avignon on the railway from Lyons to Marseilles at some distance from the left bank of the Rhone, in the midst of meadows, orchards, and mulberry plantations, watered by a stream called the Meyne, and overlooked by the majestic summit of Mount Ventose, which lies twenty-two miles to the east. The district is highly fertile, and the city deals largely in silks, woollens, and fruits, and also till quite recently in wines and madder. The population of the city numbers 6,860.

ORANGE, a city of the United States, in Essex county, New Jersey, sixteen miles west of New York by two lines of railway, and connected by horse-cars with Newark, three and one-half miles distant. Beautifully situated on rolling ground about 190 feet above the sea, Orange has become a favorite place of residence for New York business men. To the west lies Llewelyn Park, an area of 750 acres, studded with villas and laid out in common; and the summit of Orange Mountain (650 feet), a little farther west, is also occupied with villas. Hatmaking is largely carried on in the city. The population was 9,348 in 1870, 13,207 in 1880, and 18,844 in 1890. In 1860 the township of Orange received a town charter, and in 1872 the town, diminished by East Orange and parts of South and West Orange, was raised to the rank of a city.

ORANGEMEN, an association of Irish Protestants, originating and chiefly flourishing in Ulster, but with ramifications in other parts of the United Kingdom, and in the British colonies. Orangemen derive their name from William III. They are enrolled in lodges.

Orangeism is essentially political, and may be useful in so far as it reminds Irish Protestants of their origin and of their common rights under the British crown. But its original object was the maintenance of Protestant ascendancy, and too much of its spirit still survives. By repeating irritating watchwords, and publicly keeping anniversaries painful to their neighbors, Orangemen have done much to inflame sectarian animosity; if their celebrations were private, little could be said against them. The first regular lodges were founded in 1795, but the system existed earlier. The Brunswick clubs, founded to oppose Catholic emancipation, were sprigs from the original Orange tree. The orange flowers of the *Lilium bulbiferum* are worn in Ulster on July 1st and 12th, the anniversaries of the Boyne and Aughrim. Another great day is November 5th, when William III. landed in Torbay.

ORANGE RIVER FREE STATE, an independent republic adjoining the Cape Colony, South Africa, is bounded on the north by the Vaal river, south by the Orange river, east by the Caledon river and Drakensberg mountains, and west by a line dividing it from Kimberley and the diamond fields of Griqualand West. The area is 70,000 square miles, and the population in 1880 was 133,518. Of this total 61,022 were whites or of European extraction (mostly Dutch), and 72,496 colored or of native races.

The climate is salubrious, and specially remarkable for its dryness. Thousands of wild game formerly occupied the plains of the state, but their numbers and variety have of late greatly diminished, and some have

been entirely exterminated. The lion, giraffe, elephant, and rhinoceros are no longer found. But in a few districts there may still be seen considerable herds of antelopes, such as springbok, blesbok, and wildebeeste orgnu. The resources of the state are agricultural, pastoral, and mineral. The principal occupations of the inhabitants are the breeding of cattle, horses, goats, merino sheep, and ostriches. Agriculture is attended to on a larger or smaller scale according to the capabilities of the various farms, and vineyards and orchards are planted on many properties. The staple articles of export, however, are wool, skins, ostrich feathers, and diamonds, all of which are shipped from the seaports of the Cape Colony and Natal.

Bloemfontein, the capital and seat of government, is situated about the center of the state, in 28° 56' S. latitude and 26° 18' E. longitude. It is an agreeable town, with a population of about 3,000, and has a handsome range of public offices, where the volksraad or assembly of the people meets, a high court (consisting of a chief-justice and two puisne judges), a municipal burgher council, two banks, two newspapers, two hotels, clubs, a college, schools, and several churches, including the Dutch Reformed church, the Anglican church with a resident bishop, and Wesleyan, Lutheran, and Roman Catholic churches. The Dutch language is officially used in the volksraad and the courts of justice, but English is spoken by the community generally.

ORANIENBAUM, a town of European Russia, with a population of about 4,000, lies 100 feet above the sea on the south coast of the Gulf of Finland, opposite Cronstadt, and is well known for its imperial palace and as a summer resort for the inhabitants of St. Petersburg, from which it is twenty-four miles distant by rail.

ORATORIAL. See NERI.

ORATORIO. See MUSIC.

ORCAGNA, whose full name was ANDREA DI CIONE, called ARCAIGNUOLO, was the son of a very able Florentine goldsmith, Maestro Cione, said to have been one of the principal artists who worked on the magnificent silver frontal of the high altar of San Giovanni, the Florentine Baptistery. He lived from 1316 to 1376. The result of Orcagna's early training in the use of the precious metals may be traced in the extreme delicacy and refined detail of his principal works in sculpture.

ORCHESTRA. See MUSIC.

ORCHHÁ, or TEHRI, a native state in Bundelkhand, Central India, to the south of the British district of Jhānsi. The area is about 2,000 square miles; the population in 1881 was 311,514.

ORCHIDS. The flowers of all orchids, though extremely diverse within certain limits, and although superficially very different from those of other monocotyledons, are all formed upon one common plan, which is only a modification of that observable in such flowers as those of the narcissus or snowdrop (*Galanthus*).

The floral structure is so curious that perhaps less attention has been paid to the vegetative organs than the peculiarities of their organization demand. There is often a marked alteration in the production of vegetative and flowering shoots respectively; and, sometimes, from various circumstances, the flowering shoots are not produced for several years in succession. This fact will account for the profusion with which some orchids, like the common bee orchis for instance, are found in some seasons and their scarcity in others. Tropical orchids are mostly epiphyta—that is, they grow upon trees without deriving nourishment from them. They are frequently provided with "pseudo-

bulbs," large solid swellings of the stem, in the tissues of which water and nutritive materials are stored. Very generally, too, such plants have aërial roots, of thick or thin wire-like form, covered with a spongy white investment, the constituent cells of which are found under the microscope to contain spiral fibers tightly coiled up within them. By these "air-roots" the plants are able to absorb watery vapor and perhaps actual water.

The number of species of orchids is greater than that of any other monocotyledonous order—not even excepting grasses—amounting to between 4,000 and 5,000 at least. This large number is partly accounted for by the diligent search in all countries that has been made for these plants for purposes of cultivation—they being held at present in the greatest esteem by plant-lovers, and prices being paid for new or rare varieties which recall the days of the tulipomania. It must be admitted, however, that orchid-lovers have better reasons to support their fancy than had the speculative growers and barterers of tulips.

The economic uses of orchids are not remarkable. When we have mentioned vanilla, which consists of the pods of an orchid, we have mentioned about the only economic product that now comes into market. Salep, still used in the Levant, consists of the dried tubers of some terrestrial orchid, and contains a relatively large amount of nutritious matter.

ORCHIL. See ARCHIL.

ORCHOMENUS, the name borne by two cities of ancient Greece.

I. A Bœotian city, situated in the angle between the Cephissus and its tributary the Melas, on a long narrow hill which projects south from Mount Acontium. Orchomenus was the capital of the Minyæ, a race famous in the half-legendary history of early Bœotia; the sway of the Minyæ once extended over Bœotia, including even Thebes, but the Æolic Bœotians who made Thebes their stronghold broke the power of the Orchomenian kings.

II. An Arcadian city, situated in a district of the same name, north of Mantinea and west of Stymphalus. The old city occupied a strong and lofty situation; in the time of Strabo it was a ruin, but Pausanias mentions that a new town was built below the old.

ORDEAL (Anglo-Saxon *ordâl*, *ordæl*, judgment) corresponds to modern German *urtheil*, but bears the special sense of the Mediæval Latin *Dei iudicium*, a miraculous decision as to the truth of an accusation or claim. The ordeal had existed for many ages before it was thus named in Europe. In principle, and often in the very forms used, it belongs to ancient culture, thence flourishing up to the mediæval European and modern Asiatic levels, but dying out before modern civilization. Some ordeals, which possibly represent early stages of the practice, are simply magical, being processes of divination turned to legal purpose. Thus in Burmah suits are still determined by plaintiff and defendant being each furnished with a candle, equal in size and both lighted at once—he whose candle outlasts the other being adjudged, amid the acclamations of his friends, to have won his cause. Even quainter is a Dyak ordeal in Borneo, where the two parties are represented by two shell-fish on a plate, which are irritated by pouring on some lime-juice, and the one first moving settles the guilt or innocence (as has been before arranged) of its owner. The administration of ordeals has been much in the hands of priests, and they are more often than not worked on a theological basis, the intervention of a deity being invoked and assumed to take place even when its process is in its nature one of symbolic magic. One of the most remarkable groups

of divinations passing into ordeals are those which appeal to the corpse itself for discovery of its murderer. The idea is rooted in that primitive state of mind which has not yet realized the full effect of death, but regards the body as still able to hear and act. The well-known ordeal of the bier in Europe in the Middle Ages seems founded on the imagination that a sympathetic action of the blood causes it to flow at the touch or neighborhood of the murderer. Apparently the liquefaction of the blood which in certain cases takes place after death may have furnished the ground for this belief. On Teutonic ground, this ordeal appears in the *Nibelungenlied*, where the murdered Siegfried is laid on his bier, and Hagen is called on to prove his innocence by going to the corpse, but at his approach the dead chief's wounds bleed afresh. The typical instance in English history is the passage of Matthew Paris, that after Henry II.'s death at Chicon his son Richard came to view the body, "Quo superveniente, confestim erupit sanguis ex naribus regis mortui; ac si indignaretur spiritus in adventu ejus, qui ejusdem mertis causa esse credebatur, ut videretur sanguis clamare ad Deum." (Which having come to pass, immediately the blood rushed from the nose of the dead king, as if indeed he were so indignant in spirit at the arrival of him who was believed to be the cause of his death that his blood cried to God.)

The close historical connection of the Hindu ordeal laws with the old European is shown by the correspondence of minute details, as where in a Scandinavian law it is prescribed that the red-hot iron shall be carried nine steps. In Anglo-Saxon laws the iron to be carried was at first only one pound weight, but Athelstan's law enacts that it be increased to weigh three pounds. Another form well known in old Germany and England was the walking barefoot over glowing plowshares, generally nine. The law-codes of the early Middle Ages show this as an ordinary criminal procedure. Various forms of ordeal all in theory based on miraculous interference to protect the innocent were in vogue among different people, principal among them being various forms of fire ordeal and water trial—the remnant of which last has come down to our times almost in the shape of "ducking" witches.

If there is one thing that may be predicated of man in a state of nature it is that two disputants tend to fight out their quarrel. When in the warfare of Greeks and Trojans, of Jews and Philistines, of Vandals and Alamans, heroes come out from the two sides and their combat is taken to mark the powers of the opposing war-gods and decide the victory, then the principle of the ordeal by battle has been practically called in. The wager of battle was a custom among nearly all the nations of Europe till a comparatively recent period—the practice existing in England from the time of the Conqueror till 1818, when it was called into notice by an appeal to its arbitration by an accused murderer, which act led to its formal abolition.

ORDER, or ORDINATION (*Ordo seu sacra ordinatio*), one of the seven sacraments of the Roman Catholic Church (see SACRAMENT), is the rite by which the ministers of that church, in their respective ranks as priests, deacons, subdeacons, acolytes, exorcists, lectors, and doorkeepers (*ostiarii*), receive power and grace for the discharge of their several functions. The nature of these functions is stated in separate articles, (see ACOLYTE, etc.) Compare the articles CLERGY, EPISCOPACY, INDEPENDENTS, MONACHISM, PRESBYTERIANISM.

ORDERICUS VITALIS, the author of a *History* of considerable value in relation to England and Normandy in the eleventh and twelfth centuries, was born in the year 1075, at Atcham, near Shrewsbury. In the

year 1141, being, as he tells us, worn out with age and infirmities, he was fain to bring his historical labors to a close, and it is inferred that his death occurred soon after.

ORDERS OF KNIGHTHOOD. See **KNIGHTHOOD**.

ORDINARY is the legal name for a bishop or other person with original ecclesiastical jurisdiction when exercising the functions of his office. In the United States the ordinary is a public official and possesses, in States where such an officer exists, powers vested in him by the constitution and acts of the legislature. In South Carolina he is a judicial officer.

ORDNANCE. See **ARTILLERY** and **GUNS** and **GUNNERY**.

ÖREBRO, one of the most important cities in Sweden, the chief town of a province of its own name, lies on both sides of the Svarta, about a mile above its entrance into Lake Hjelm, and 160 miles by rail west of Stockholm. The population was 2,147 in 1749, 4,227 in 1840, 9,056 in 1865, and 11,785 in 1880.

OREGON, one of the Pacific States of the American Union, is bounded north by Washington, east by Idaho Territory, south by Nevada and California, and west by the Pacific, and has an area of 94,560 square miles, besides 1,470 square miles of water-surface; its average width from east to west is 345 miles, and from north to south 276 miles.

The State is divided by the Coast, Cascade, and Blue Mountains into well-marked sections. The Cascade range extends in an almost due north and south direction, parallel with the Pacific coast, and a little over 100 miles from it, entirely across the State, and thence northerly through the State of Washington into British Columbia; still farther north it forms the undefined boundary between the latter province and Alaska. In Oregon the range is heavily timbered, chiefly with coniferous evergreens, the principal trees being yellow, sugar, and scrub pine, yellow and white fir, several varieties of spruce, red and white cedar, yew, juniper, tamarack, and cypress; there is also a considerable quantity of maple, ash, and alder, and some oak in the western foothills to the south. Its most striking feature is the number of beautiful cone-shaped peaks, rising above the line of perpetual snow. Several quite low passes exist, which, however, are very little used.

Eastern Oregon is in its southern part a vast volcanic plateau, rocky and sterile, lacking water, and possessing few natural attractions. The great interior basin, without outlet to the ocean, extends far up into the State. In this region are a few lakes, generally alkaline and marshy sinks, fed by little streams which have their origin in the small neighboring mountain masses. The principal vegetation consists of several varieties of sagebrush, dwarf pine, and juniper, the last furnishing the winter food of immense numbers of deer, which, during the summer, range through the highlands and glens of the Cascades. Many small peaks and ranges rise from the plateau, all probably of volcanic origin, and some of them made up almost exclusively of blocks and masses of obsidian. The mountains are covered with pine of a very fair quality, with fir, cedar, and some maple, all of which is being rapidly cleared away. In the valleys cottonwood, willow, birch, aspen, and poplar grow freely. The hills are well stocked with the larger game, as bear, deer, mountain sheep, gray wolves, panthers, foxes, etc., the valleys and lakes with feathered game in considerable variety, and the streams with trout and salmon. Many mines of gold and silver have been found in the Blue and Powder River Mountains, but none of remarkable richness. Nearly all the untimbered plains and valleys of north-

eastern Oregon are covered with a rich growth of the hardy and nutritious "bunch grass." The soil is very deep, and, coming, as it does, from the disintegration of volcanic rocks, is very fertile. The Des Chutes river drains most of the eastern slope of the Cascades, flowing in a wild turbulent stream through a deeply-cut cañon. The river is so swift, crooked, and with such rugged banks and so many jagged rocks that it is deemed impracticable even for the lumberman's use in floating logs to the Columbia.

The warm oceanic current from Japan, flowing south along the coast, is the cause of the mild climate of western Oregon. The Willamette valley has an area of about 8,000 square miles, and contains more than half the population and wealth of the entire State. Its lower portions are loamy plains, covered with rank grass, and here and there great areas of lowland timber, such as alder, maple, ash, cottonwood, poplar, etc., and a vast profusion of shrubbery. The Umpqua is a rapid mountain stream, and its valley is narrow but extremely fertile. This and Rogue river break through the coast range in cañons, deep, rugged and heavily timbered. The valley of Rogue river is beautiful, with a delightful climate, but it has always been difficult of access. Much gold has been taken from the placer mines of the valley, and the sands and gravels of nearly all the tributary valleys carry the precious metal. The country lying between the Coast range and the ocean is narrow and very rugged, with some small cultivable valleys very difficult of access. There are no good harbors on the coast, but the government is making efforts to improve Coos and Yaquina bays and Port Orford.

The Columbia river enters the Pacific ocean near the forty-sixth degree of north latitude; it drains by means of its tributaries the western slope of the Rocky Mountains, from about the forty-second to the fifty-third parallel, a distance of 900 miles. The area of its drainage basin is nearly 245,000 square miles. The route of communication by the Columbia has been of the greatest importance in the early development of Oregon, and its value increases daily. The head of navigation for sea-going ships is at Portland, about 100 miles up the Columbia and 12 miles up the Willamette. From this point up to the Cascades, river craft go freely with plenty of water at all seasons of the year, with, generally, the exception of a short time each winter when the river is frozen. The cascades of the Columbia are due north from Mount Hood, just on the central line on the range where it is cut through by the river. Above the Dalles the Columbia is navigable for 190 miles and the Snake for 180. The Northern Pacific Railroad passes down on the Oregon side, through the cañon of the Columbia. The Columbia is noted for its beautiful scenery, for the great quantity of salmon taken from its waters.

The southwest warm winds from the Pacific distribute vapors over western Oregon abundantly in autumn, winter, and spring in dews, fogs, rains, and occasional snows, and over eastern Oregon in less amounts. The northwest summer winds are cool. The average temperature in western Oregon is—in spring 52°, in summer 67°, in autumn 53°, and in winter 39° Fahr.

Since the occupation of the State by civilized men the grizzly, black, and cinnamon bears, gray wolf, coyote, panther, catamount, wildcat and polecat, deer, antelope, elk, and mountain sheep have slowly retreated from the settlements to the recesses of the hills. Fur-bearing animals have increased since the Hudson's Bay Company withdrew from the country. Silver foxes, martens, hares, rabbits, squirrels, raccoons, porcupines, beaver, otter, muskrats, and seals are found in greater or less abundance within the State. Salmon, herrings,



trout, halibut, smelt, and other fish in countless numbers exist in the Columbia and its branches and in the bays and coast rivers, and oysters, shrimps, crabs, and clams along the shores. Eagles, hawks, cormorants, pelicans, gulls, cranes, albatross, vultures, buzzards, ravens, crows, jays, robins, swallows, sparrows, rice-birds, yellow-birds, humming-birds, swans, geese, ducks, pigeons, and many other varieties of birds are found. Reptiles and insects are numerous. The forests of Oregon contain innumerable species of trees, and the development of the lumber interests bears great promise for the material prosperity of the State, vast tracts of land being yet untouched, and containing timber of enormous value.

Wheat is the chief crop for home use and for export. All the smaller cereals are grown and produce largely. Flax is indigenous in southern and eastern Oregon; it is cultivated both for seed and for lint. Maize gives a fair harvest, though the nights are too cool for the best results. Vegetables of all kinds common to the temperate zone flourish, and orchard and garden fruits are sure. One species of clover is indigenous, but all varieties grow and spread rapidly over fields, pastures, and burnt forest lands.

Subjoined are the agricultural statistics for the year 1888-89 specified.

Crops.		Acres.	Value.
Indian corn.....bushels	182,000	6,673	\$116,480
Wheat....."	16,100,000	920,026	10,948,000
Rye....."	20,000	1,379	15,000
Oats....."	5,547,000	203,183	2,218,800
Barley....."	761,000	35,890	342,450
Buckwheat....."	11,000	774	6,050
Potatoes....."	1,058,000	13,743	550,160
Hay.....tons	655,988	468,563	7,215,868
Total.....		1,650,231	\$21,412,808

The minerals of the state comprise gold, silver, iron, copper, nickel, platinum, iridium, chrome ore, cement, manganese, and coal. The development of these minerals is as yet in its infancy, but the amount of the various ores in sight leads to the belief that their aggregate value is enormous.

The statistics of manufactures according to last census are as follows:—

Establishments, 1,080; capital, \$6,312,056; hands employed (average), 3,473; wages, \$1,677,046; value of materials, \$6,954,436; value of products, \$10,931,232.

The principal industries ranked as follows in 1880:—

Selected Industries.	Establishments.	Capital.	Value of Material.	Value of Product.
Flouring and grist mill products...	106	\$1,286,200	\$2,978,714	\$3,475,531
Lumber, sash, doors, & blinds.	248	1,808,275	1,475,322	2,284,155
Woolen goods....	10	566,800	227,486	549,030
Foundry and machine-shop products.....	16	260,500	121,911	352,300
Tinware, copperware, and sheet-iron ware.....	46	233,150	151,475	311,650
Other industries..	654	2,157,131	1,999,528	3,958,566
Total of all industries....	1,080	\$6,312,056	\$6,954,436	\$10,931,232

Oregon has three ports of entry—Astoria on the Columbia, Portland on the Willamette, and Coos Bay on the southern coast. The salmon-canning business began in 1866 with a product of 4,000 cases, valued at \$64,000; the average annual value now exceeds \$3,000,000. Between Astoria and the cascades of the Columbia river there are numerous canneries.

In 1865 there were in Oregon 19 miles of railway open; in 1875, 248; in 1880, 582; on January 1, 1889, 1,412 miles. Steamers ply between Portland and San Francisco (670 miles), and at frequent intervals on the Columbia river, on the Willamette, and on the Snake river.

The statutes of Iowa and New York were the models of the provisional government of Oregon, and legislation has continued generally on these lines. The courts consist of a supreme court, with appellate jurisdiction, situated in Salem, the capital, and five circuit or district courts, with county courts and justices' courts in every precinct of city and county. Cities have police courts also. There is a United States district court for Oregon, and a United States circuit court for Oregon with California and Nevada. Provision has been made and funds are on hand for payment of bounty relief, Modoc and Indian war bonds, and \$495.54 warrants payable from outstanding warrant fund, they all having been advertised but not presented for payment. State receipts for two years ending December 31, 1888, \$713,123.97; expenditures for two years, \$682,887.74. Assessed valuation, 1887, \$85,893,429. Tax levy, 3.70 mills, \$317,805.68; militia tax, \$17,178.69; university tax, \$8,539.34; total, \$343,573.71. Various warrants, \$5,911.29. Less available cash, \$3,054.29. Balance unprovided for, \$2,857. Population, 300,000. Valuation per capita, \$286.31. Tax per capita, \$1.06.

In 1848 Congress granted to Oregon one-eighteenth of all the public domain for free schools. This area (3,387,520 acres) was received by the State on its admission to the Union for the education of all its youth of both sexes. Congress also granted about twenty-six townships (500,000 acres) for a State university, and 90,000 acres for an agricultural college. A portion of these lands has been sold, and the proceeds have been made an irreducible fund for the objects named. The free-school system has been established in every county and almost every settlement. The number of districts for 1888-89 was 1,497; school population, 86,547; average attendance of pupils, 35,473; number of teachers, 2,091; number of schoolhouses, 1,384; value of school property, \$1,295,217. This estimate does not include a large number of pupils and teachers in private schools, which partly accounts for the discrepancy between school population and average attendance. Besides the schools enumerated here the State maintains several charitable institutions of instruction.

Cities and Chief Towns.—PORTLAND (*q.v.*), on the Willamette, 115 miles from the ocean, is the chief city of the Pacific coast north of San Francisco; Astoria is a commercial city, with large salmon-canning establishments, which do an annual business of over \$3,000,000; Oregon City, at the falls of the Willamette, is a flourishing manufacturing town; Salem (the capital), Albany, Corvallis, Eugene City, Roseburg, The Dalles, Pendleton, Union, and Baker City are places of rapidly-growing importance.

Population.—The development of Oregon during the last four decades has been uniform and encouraging. In 1850 there were only 13,000 inhabitants; in 1860 the number had quadrupled. Ten years later the population was 90,923, and in 1880 it had reached 174,768. The official figures of the United States census of 1890 show a total of 312,490, an increase since the last decennial enumeration of over 56 per cent. The proportion of males to females is about ten to seven.

History.—Oregon at first included all the United States territory between the Pacific ocean and the Rocky Mountains north of the forty-second parallel, and thus had a total area of over 300,000 square miles. Oregon

was afterward held by the United States Government to have been included in the sale of "Louisiana" by France in 1803. In 1804-5 Lewis and Clarke explored the Columbia to its mouth and reported the great resources of the country. In 1810 Captain Winship, a New Englander, built the first house in Oregon, on the Columbia; and in 1811 John Jacob Astor, of New York, established a fur-trading post fifteen miles from the ocean, at Astoria, on that river. In 1813, during the war, his agent sold it to the Northwestern Fur Company, who called it Fort George. Though restored to the United States after the war, it was held by the company, and in 1821 it passed, with their other possessions, into the hands of the Hudson's Bay Company. The British laid claim to Oregon by virtue of Drake's discovery of the coast in 48° N. latitude in 1558, of Cook's visit to De Fuca Strait in search of a northwest passage in 1778, and of the survey of the coast from 30° to 60° N. latitude, by order of the British Admiralty, made by Vancouver (who was with Cook in 1778), to find a northwest passage, and his discovery and ascent of the Columbia to the site of the present city of Vancouver in 1792. A treaty of "joint occupation" was made in 1818 between the United States and Great Britain which left these conflicting claims for future settlement and only served to prolong and increase the disagreement. The British finally offered to compromise on the Columbia. In 1824 some employes of the Hudson's Bay Company set out a few fruit-trees and cultivated a garden at Fort George (Astoria). In 1832 Capt. Nathaniel Wyeth, of Wenham, Mass., established a fishery on Savrie's Island. In 1835 Rev. Samuel Parker and Dr. Marcus Whitman were commissioned to explore and plant a mission in Oregon. Under convoy of the yearly expedition of the American Fur Company, Dr. and Mrs. Whitman, Rev. H. H. Spalding and Mrs. Spalding, and Mr. W. H. Gray "crossed the plains" in 1836, traveling 2,300 miles from the Missouri line, and began a mission among the Indians of eastern Oregon. These two ladies were the first white women who crossed the Rocky Mountains. The missionaries formed the nuclei of settlements; trappers, adventurers, and western pioneers followed; cattle were secured from California, and in 1842 steps were taken for a government, by a choice of officers. A provisional government was organized that year by the people. More immigrants followed. In 1846 a treaty was concluded between Great Britain and the United States fixing the boundary at 49° N latitude. In 1848 Congress established a Territorial government, and the Governor, Gen. Joseph Lane, arrived in March, 1849. United States courts were then established. On November 28, 1847, Dr. and Mrs. Whitman, along with twelve others, were murdered by the Indians. War followed, and again broke out in 1855. Other wars against the Indians occurred in 1877 and 1878, but the tribes have mostly been placed upon reservations, under educational and industrial training. They have become peaceable and partially self-supporting, though paid in annuities for their lands. The Territory was admitted into the Union as a State on February 14, 1859.

OREL, or ORLOFF, a government of central Russia, bounded by Smolensk, Kaluga, and Tula on the north, and by Voronezh, Kursk, and Tchernigoff on the south, with an area of 18,040 square miles. The population, 1,596,900 in 1870, and 1,877,100 in 1881, consists almost exclusively of Great Russians belonging to the Greek Church.

OREL, the capital of the above government, lies at the confluence of the Oka with the Orlik, on the great line of railway to the Crimea, 238 miles south-southwest from Moscow. Population (1875), 45,000; 1881, 76,700.

ORENBURG, a government of southeastern Russia, bounded on the north by Ufa and Perm, on the south and east by the steppe of the Orenburg Kirghiz, and on the west by Samara, has an area of 73,890 square miles. The population (900,550 in 1870) numbered 1,120,700 in 1881.

ORENBURG, capital of the above government, is situated on the right bank of the Ural river, 933 miles by rail southeast from Moscow. The population is 35,600.

ORENSE, an inland province of Spain, is bounded on the north by Pontevedra and Lugo, on the east by Leon and Zamora, on the south by Portugal (Traz oz Montes), and on the west by Portugal (Entre Douro e Minho) and Pontevedra, and has an area of 2,738 square miles. The population in 1887 was 398,835; only one town (Orense) had a population exceeding 10,000.

ORENSE, capital of the above province, and the see of a bishop, suffragan to Santiago, stands on the western slope of Montealegre, on the left bank of the Minho. In 1887 the town had a population, within the ayuntamiento, of 15,586.

ORESTES, son of Agamemnon and Clytæmnestra. He was preserved by his sister Electra, and conveyed to Phanote on Mount Parnassus, where king Strophius took charge of him. In his twentieth year he was ordered by the oracle to return home and revenge his father's death. According to Æschylus, he met his sister Electra before the tomb of Agamemnon, whither both had gone to perform rites to the dead; a recognition takes place, and they arrange how Orestes shall accomplish his revenge. Orestes, after the deed, goes mad, and is pursued by the Erinnyes, whose duty it is to punish any violation of the ties of family piety. He takes refuge in the temple at Delphi; but, though Apollo had ordered him to do the deed, he is powerless to protect his suppliant from the consequences. At last Athena receives him on the acropolis of Athens and arranges a formal trial of the case before twelve Attic judges. The Erinnyes demand their victim; he pleads the orders of Apollo; the votes of the judges are equally divided, and Athena gives her casting vote for acquittal. The Erinnyes are propitiated by a new ritual, in which they are worshiped as Eumenides (the Kindly), and Orestes dedicates an altar to Athena Areia.

ORFA. See EDESSA.

ORFILA, MATHIEU JOSEPH BONAVENTURE, the founder of modern toxicology, and one of the most eminent of the French school of medicine during its brightest period, was by birth a Spaniard, having been born at Mahon, in Minorca, on April 24, 1787. He died in 1853.

ORFORD, EARLS OF. See WALPOLE.

ORGAN. The notes of the organ are produced by *pipes*, which are blown by air under pressure, technically called *wind*. Pipes differ from one another in two principal ways: (1) in *pitch*, (2) quality of tone. Pipes are divided first into *flue-pipes* and *reed-pipes*. Flue-pipes are blown by a wind mouthpiece, characteristic of the organ, while in reed-pipes the wind acts on a metal tongue vibrating on a reed, and the motion of the tongue determines the speech of the pipe.

Pipes are made either of wood or of metal. Wood flue-pipes are generally of the form of a rectangular paralleliped, metal flue-pipes of a cylindrical shape. Reed-pipes are conical or pyramidal, and widen toward the top. Some flue-pipes are made with stopped ends; these as a rule sound a note about an octave lower than the corresponding open pipes of the same length. Such are the stopped diapason, bourdon, and stopped flute.

The general elementary theory of the resonance

of a pipe is tolerably simple. The effective length of the pipe is determined by measuring from the upper lip to the open end in open pipes, and from the upper lip to the stopper and back again in stopped pipes. To this is added an allowance for the effect of each opening, since the condition of perfect freedom from constraint does not subsist at the opening itself. The corrected length is traversed twice (backward and forward) by sound, in the time of one vibration of the resultant note. This describes in a rough and general manner the way in which any disturbance gives rise to the note of the pipe; but the theory of the mouthpieces is a much more difficult matter, into which we cannot here enter.

In reed-pipes which are simply conical the resonance of the body is nearly the same as that of an open pipe of the same length. Where the form is irregular no simple rule can be given. But the resonance of the body of the pipe is generally the same as the note produced. The tongue of a reed-pipe alternately opens and closes the aperture of the reed. In this way it admits pulses of wind to the body of the pipe; these, if they recur at the proper intervals, maintain its vibration, which takes place when the note produced corresponds to the resonance of the pipe. The reed itself has its vibrating length determined by a wire which presses against it. The free end of this wire is touched with the tuning tool until a satisfactory note is produced.

The pitch of the different stops is commonly denoted by the conventional approximate length of the pipe sounded by C, the lowest key of the manual. Even in incomplete stops which have no bass, the length of the pipe which C would have if the stop were extended down serves to indicate the pitch.

The true or accurate lengths of the pipes vary within considerable limits. The base of the scales (dimensions) varies according to the standard of pitch, and the voicing and the complicated natural laws of pipes produce other deviations from simple relations, so that the conventional dimensions can only be regarded as a simple means of classifying the stops according to their pitch-relations.

Each of the manuals, or rows of keys, of an organ constitutes a separate organ, which is more or less complete in itself. The names of the different manuals or organs are *great organ*, *swell organ*, *choir organ*, and *solo organ*. The fifth manual, where it occurs, is the *echo organ*.

The pedal forms the general base to the whole organ. Thirty-two foot-stops only occur in the largest instruments. The thirty-two-foot open diapason, whether wood or metal, is usually made of large scale, and produces true musical notes throughout. Its musical effect in the lower part of its range is, however, questionable, so far as this depends on the possibility of recognizing the pitch of the notes. It adds great richness to the general effect, particularly in large spaces. The thirty-two-foot reed on the pedal has long been a characteristic of the largest instruments. With the old type of reed it was rarely pleasant to hear. The manufacture has been greatly improved lately, and these large reeds are now made to produce a fairly smooth effect. Deep reed notes, when rich and good, undoubtedly form one of the principal elements in giving the impression of power produced by large organs. From this point of view they are of great importance. Nevertheless the effect of large pedal reeds is generally more satisfactory to the performer than to the listener. The sixteen-foot pitch may be regarded as the normal pitch of the pedal.

The diversities of the arrangements of different organs present a great difficulty. The best players take a cer-

tain time to master the arrangements of a strange instrument. With a view to the introduction of uniformity, a conference on the subject was arranged by the College of Organists in London, and a series of resolutions and a series of recommendations were published which deserve attention (1881). They go into considerable detail, and we must refer to the document itself.

HISTORY OF THE ORGAN.

The early history of the organ is very obscure. As far back as classical times literary allusions occur occasionally to wind instruments involving the use of pipes and channels and reservoirs of air. Some form of bagpipe appears to have been alluded to in this way. Vitruvius has left a description of the *hydraulicon*, or hydraulic organ. It is clear that it must have been a machine of some complexity; but the way in which it acted is not intelligibly described.

A treatise on the construction of organs by a monk named Theophilus is assigned to the early part of the eleventh century. While some of the practical work is recognizable, most of the descriptions are unintelligible. It appears clear, however, that no keyboard is mentioned.

The first keyboard is said to have been introduced into the organ in the cathedral at Magdeburg about the close of the eleventh century. There were sixteen keys; and a drawing exists in a work of the seventeenth century which purports to represent them. As to the precise time and conditions under which the keyboard assumed its present form we know nothing.

The mode of blowing practiced about the time of the introduction of the first keyboard appears to have been that which ultimately developed into the method still generally used in Germany. There were a great many separate bellows, each like a magnificent kitchen-bellows, but provided with a valve, so that the wind could not return into the bellows. One man had charge of two of these. Each foot was attached to one bellows, and the blower held on by a bar above. It was possible, by raising each of the two bellows in turn and then resting his weight upon it, to produce a constant supply of wind with the pressure due to his weight. A great many such bellows were provided, and it seems that each pair required one man; so that great numbers of blowers were employed. A slight modification is enough to change this method into the German one. Instead of fastening the feet to the bellows and pulling them up, the blower treads on a lever which raises the bellows. The bellows, being loaded, then supplies the wind of itself. The bellows thus used have diagonal hinges, and various expedients are employed to make them furnish steady wind. But the English system of horizontal reservoirs and feeders appears far superior.

While the notes were still few, and many pipes were connected with each note, the system of forming a chord on each note appears to have originated, which survives in the modern mixture. There was not at that time anything of the nature of stops; all the pipes connected with any one note sounded without exception whenever the note was made use of. The object probably was to give the single notes a powerful and dominating character, so as to enable them to lead the church song.

The invention of the pedal may be set down to the fifteenth century. About that time the organ assumed on the Continent the general form which it has retained till lately, more especially in Germany.

The reed organ is an American invention, the first organ of this class being made in 1818 by Aaror M. Peasley. J. H. Bozin also claims distinction as an inventor in this connection. The earliest forms of this instrument were called "seraphines" and "melodeons."

The American reed organ is generally acted on by suction instead of by blowing, the bellows being worked by the feet. This improvement was due to Jeremiah Carhart, about 1837. About 1848 Emmons Hamlin made the improvement of bending and twisting the reeds by which means the quality and capacity of the organs were greatly improved. The system of "voicing reeds," as this arrangement was called, was first introduced by the firm of Mason & Hamlin, of which the inventor of the system became a member, and the uniform excellence of their instruments has placed this firm in the front rank of makers. Other improvements have resulted in the production in America of an instrument superior to all others, and great numbers of this class of organ are exported.

ORGIES is a name given to certain rites in the worship of Dionysus-Bacchus. The rites, which were restricted to women, were celebrated in the winter among the hills, in spots remote from city life. The women met in such places clad in fawn-skins with hair disheveled, swinging the thyrsus and beating the cymbal; they danced and worked themselves up to a state of mad excitement. The holiest rites took place at night by the light of torches. A bull, the representative of the god, was torn in pieces by them as Dionysus-Zagreus had been torn; his bellowing reproduced the cries of the suffering god. The women tore the bull with their teeth, and the eating of the raw flesh was a necessary part of the ritual. Then the dead god was sought for. Some further rites, which varied in different districts, represented the resurrection of the god in the spring.

ORIBASIUS. See MEDICINE.

ORIFLAMME. See FLAG.

ORIGEN. Of all the theologians of the ancient church, with the possible exception of Augustine, Origen is the most distinguished and the most influential. He is the father of the church's science; he is the founder of a theology which was brought to perfection in the fourth and fifth centuries, and which still retained the stamp of his genius when in the sixth century it disowned its author. It was Origen who created the dogmatic of the church and laid the foundations of the scientific criticism of the Old and New Testaments. Orthodox theology has never, in any of the confessions, ventured beyond the circle which the mind of Origen first measured out. It has suspected and amended its author, it has expunged his heresies; but whether it has put anything better or more tenable in their place may be gravely questioned.

Origen was born, perhaps at Alexandria, of Christian parents, in the year 185 or 186. Till near the end of the second century the line between heresy and orthodoxy was less rigidly drawn there than at Ephesus, Lyons, Rome, or Carthage. In the year 202 a persecution arose, in which the father of Origen became a martyr, and the family lost their livelihood. Origen, who had distinguished himself by his intrepid zeal, was supported for a time by a lady of rank, but began about the same time to earn his bread by teaching; and in 203 he was placed, with the sanction of the bishop Demetrius, at the head of the catechetical school. His manner of life was ascetic; the sayings of the Sermon on the Mount and the practical maxims of the Stoics were his guiding stars. Four oboli a day, earned by copying manuscripts, sufficed for his bodily sustenance. A rash resolve led him to mutilate himself that he might escape from the lusts of the flesh, and work unhindered in the instruction of the female sex. This step he afterward regretted. As the attendance at his classes continually increased—pagans thronging to him as well as Christians—he handed over the beginners to his friend Heraclas, and took charge of the more advanced pupils

himself. Meanwhile the literary activity of Origen was increasing year by year. He commenced his great work on the textual criticism of the Scriptures; and at the instigation of his friend Ambrosius, who provided him with the necessary amanuenses, he published his commentaries on the Old Testament and his dogmatic investigations. In this manner he labored at Alexandria for twenty-eight years (till 231–232). On his way to Greece (apparently in the year 230) Origen was ordained a presbyter in Palestine by his friends the bishops. This was undoubtedly an infringement of the rights of the Alexandrian bishop; at the same time it was simply a piece of spite on the part of the latter that had kept Origen so long without any ecclesiastical consecration. Demetrius convened a synod, at which it was resolved to banish Origen from Alexandria. Even this did not satisfy his displeasure. A second synod, composed entirely of bishops, determined that Origen must be deposed from the presbyterial status. This decision was communicated to the foreign churches, and seems to have been justified by referring to the self-mutilation of Origen and adducing objectionable doctrines which he was said to have promulgated. The details of the incident are, however, unfortunately very obscure. No formal excommunication of Origen appears to have been decreed; it was considered sufficient to have him degraded to the position of a layman. The sentence was approved by most of the churches, in particular by that of Rome. At a later period Origen sought to vindicate his teaching in a letter to the Roman bishop Fabian, but, it would seem, without success. Even Heraclas, his former friend and sharer of his views, took part against him; and by this means he procured his own election shortly afterward as successor to Demetrius.

In these circumstances Origen thought it best voluntarily to retire from Alexandria (231–232). He betook himself to Palestine, where his condemnation had not been acknowledged by the churches any more than it had been in Phœnicia, Arabia, and Achaia. He settled in Cæsarea, and very shortly he had a flourishing school there, whose reputation rivaled that of Alexandria. His literary work, too, was prosecuted with unabated vigor. Enthusiastic pupils sat at his feet (see the *Panegyric* of Gregory Thaumaturgus), and the methodical instruction which he imparted in all branches of knowledge was famous all over the East. Here again his activity as a teacher was interrupted by frequent journeys. Thus he was for two years together at Cæsarea in Cappadocia, where he was overtaken by the Maximinian persecution; here he worked at his recension of the Bible. We find him again in Nicomedia, in Athens, and twice in Arabia. He was called there to combat the unitarian christology of Beryllus, bishop of Bostra, and to clear up certain eschatological questions. As he had formerly had dealings with the house of Alexander Severus, so now he entered into a correspondence with the emperor Philip the Arabian and his wife Severa. But through all situations of his life he preserved his equanimity, his keen interest in science, and his indefatigable zeal for the instruction of others. In the year 250, the Decian persecution broke out, Origen was arrested, imprisoned, and maltreated. But he survived these troubles—it is a malicious invention that he recanted during the persecution—and lived a few years longer in active intercourse with his friends. He died, probably in the year 254 (consequently under Valerian), at Tyre, where his grave was still shown in the Middle Ages. He was probably the most prolific author of the ancient church.

ORIHUELA, a town and episcopal see of Spain, in the southern portion of the province of Alicante, thirteen miles northeast from Murcia and about fifteen from the sea, is situated in a beautiful and exceedingly fertile

"huerta," at the foot of a limestone ridge of moderate height, and on both sides of the Segura, here crossed by two bridges. The most prominent buildings are the episcopal palace (1733), with a frontage of 600 feet, but partly ruinous; the town-house (1843), containing the municipal archives and a considerable number of curious and important documents of national history; and the cathedral, a comparatively small Gothic structure built on the site of a former mosque in the fourteenth century, and enlarged and tastelessly restored in 1829. Besides numerous primary schools there are a theological seminary and a normal school. The final separation of Orihuela from the diocese of Cartagena took place in 1564. The inhabitants are largely engaged in agriculture, the trade in fruit (oranges and citrons, pomegranates, dates), as well as in cereals, oils, and wine, being considerable. The population of the ayuntamiento was 20,929 in 1877.

ORILLIA, a village in the county of Simcoe, Province of Ontario, Canada, is located on Lake Couchiching and at the junction of the Northern and Midland railroads. The village is eighty-five miles from Toronto and twenty-two miles from Barrie, communication being had with the latter city by a line of steamers. It is well built, containing three churches, three newspaper offices, an asylum for the insane, and a number of stores, in addition to several gristmills, sawmills, planing-mills, and other enterprises connected with the lumber industry; also an iron foundry, brewery, tannery, and several hotels. The present population (1890) is estimated at 5,500.

ORINOCO, a river in the north of South America, which falls into the Atlantic on the northeast seaboard after draining an area of at least 366,000 square miles (belonging to Venezuela and Colombia) in a course of about 1,500 miles. Between the source of its westmost affluent, the Guaviare, and that of its eastmost, the Caroni, there is a difference of fourteen degrees of longitude. The headwaters of the main stream rise on the southern slope of the Sierra Parime; but the branch which keeps the name Orinoco has not yet been traced by any foreigner, and the position of the lake from which, according to native report, it issues can only be vaguely fixed. The annual inundation of the Orinoco, which makes a kind of false start in April, and, gradually increasing in May, June, and July, reaches its height in September, is extensive enough to lay the country under water in some places for scores of miles inland. As most of the regions through which it passes are in a state of nature, and there is hardly, with the exception of ANGOSTURA, a town of any considerable size on the banks of either main stream or affluents, this noble river-system is but little turned to account for commerce. Not only, however, is it easily navigable for steamers for nearly 800 miles, but, as the lower part of its course lies in the line of the trade-winds, sailing-craft are able to make their way slowly upward against the current. Even at the junction of the Guaviare the height above the sea is only 744 feet.

ORIOLE, from the Old French *Oriol* and that from the Latin *aureolus*, the name once applied to the bird, from its golden coloring, which is now generally admitted to be the *Vireo* or *ICTERUS* of classical authors—the *Oriolus galbula* of Linnæus—but now commonly used in a much wider sense. The nest of the Golden Oriole is a beautifully interwoven fabric, suspended under the horizontal fork of a bough, to both branches of which it is firmly attached, and the eggs are of a shining white sometimes tinged with pink, and sparsely spotted with dark purple. On the Continent of Europe it is a well known if not an abundant bird, and its range in summer extends so far to the east as Irkutsk, while

in winter it is found in Natal and Damaraland; and both in Asia and Africa are several other species more or less resembling *O. galbula*, but some depart considerably from that type.

ORION, the name of a constellation which has been the center of many legends in Greece. It bears the form of a warrior carrying a club, and wearing a girdle which is composed of three very beautiful stars. Its disappearance in the autumn is the prelude to storms and rain. The legendary hero Orion, or, as Pindar calls him, Oarion, was according to Homer a giant, fairer and taller than the Aloides. Eos, the dawn-goddess, loved him, but the gods were angry; Artemis slew him in Ortygia with kindly shaft.

ORISSA, a province of British India, forming a division or commissionership under the jurisdiction of the lieutenant-governor of Bengal. It forms the extreme southwestern portion of Bengal, bounded on the north and northeast by Chutiá Nágpur and Lower Bengal proper, east and southeast by the Bay of Bengal, south by Madras, and west by the Central Provinces.

Orissa consists of two distinct territories—a fertile alluvial delta, comprising the three British districts of Cuttack, Balasor, and Purí, occupying an area of 8,056 square miles; and a wild region of sparsely populated tributary Hill States, with an area of 16,084 square miles, the latter walling out the former from the central Indian plateau.

The population of the British districts was 3,730,735 in 1881, distributed over an area of 9,053 square miles.

ORIZABA, or ORIZAVA, a city of Mexico, in the State of Vera Cruz, is situated at a height of 3,975 feet above the sea in a well-wooded valley sixty-five miles southwest of Vera Cruz, on one of the two high roads between that city and Mexico, and since 1872 on the Vera Cruz and Mexico Railway. It is a thriving place of 20,000 inhabitants.

ORKNEY AND SHETLAND, a shire or county of Scotland formed of two separate groups of islands in the North Sea. The Orkneys are separated from the mainland of Scotland by the Pentland Firth, the breadth of which between Brough Ness in South Ronaldshay and Duncansby Head, Caithness, is about seven miles. The Shetlands lie to the northeast of the Orkneys. The distance from Dennis Head in Orkney to Sumburgh Head in Shetland is about fifty miles, but Fair Isle, which is included in Shetland, is situated midway between the two main groups. The total area of the Orkneys and Shetlands is 593,352 acres, or about 927 square miles, the area of the Orkneys being 240,476 acres, and that of the Shetlands 352,876 acres. In the Orkney group there are fifty-six islands and islets, while the Shetlands consist of about one hundred. The outline of the islands is very irregular, and through the numerous firths and sounds the tides rush with great rapidity, forming occasionally whirlpools called *roosts*, which in stormy weather frequently suck in fishing-boats, and prove dangerous even to large vessels. By the action of the waves the rocks have been worn into numerous fantastic shapes, and the coastline is also deeply indented by bays and "voes" or sea lochs, caused partly by denudation, and partly by glacial action.

The soil of Orkney varies in different islands, but generally it is either a sandy loam, or a strong but friable clay, and remarkably fertile. Large quantities of seaweed, as well as lime and marl, are available for manure. Since the opening up of more constant communication with the South, and the construction of a complete system of roads, begun in 1857, the system of cultivation has undergone a complete transformation. In Shetland

there has been no agricultural progress corresponding to that in operation in Orkney, the principal reason being insufficiency of soil, which, in many cases, has to be made or increased by collecting turf. Originally the grain supplies were obtained almost wholly from the Orkneys, and for a long period gray or black oats and bere or bigg were the only species grown, but now white oats are quite common. Frequently the grain does not ripen till the end of October or beginning of November. The small ponies peculiar to the islands are becoming scarce, though they are greatly in demand for working underground in collieries. The native cattle are a diminutive breed with small horns and short legs. They possess many of the points of the best breeds. The beef is remarkable for tenderness and flavor, and, when well fed, the cows yield a large supply of rich milk. The native sheep of Shetland possess many of the characteristics of goats. The ewes, as well as the rams, have generally short horns, and the wool is long and of very fine quality. White, black, speckled-gray, and a peculiar russet brown, called "moorat," are the prevailing colors. It is the common custom to tear out the wool from the roots by the hand, as this is said to insure a finer second crop.

The principal herring stations are at Papa-Stronsay, Deersound, Holm, and South Ronaldshay. The greater part of the catch of spring herrings is dispatched direct to Hamburg. The cod and ling fishing is prosecuted chiefly by the inhabitants of the north isles, at the Farves and near Iceland. Fishing is almost the sole occupation of the Shetland men. The Shetland herring fishery has lately made rapid strides, but the increase in the take of herrings is partly due to boats from the south. As the herring fishery has increased, the deep-sea ling and cod fishery, formerly the mainstay of the islands, has proportionately diminished. The total number of persons now employed in the fisheries of the Orkneys and Shetlands together is about 11,000, Shetland employing over 7,430. The number of smacks belonging to the Orkneys is thirty, employing over 300 men; Shetland possesses about double this number, and the smacks are much more successful than those of Orkney, as more of them frequent the distant fishing-grounds. Shetland has, in addition to these, over 300 decked first-class and a large number of smaller fishing-boats.

The islands of Orkney and Shetland form one sheriffdom or stewardry, but the sheriff has a substitute in Orkney and another in Shetland. The county of Orkney and Shetland returns one member to parliament; Orkney includes eighteen parishes and Shetland twelve. In 1889 the population of Orkney was over 30,000. The population of Shetland is about 30,000.

ORLANDO, a growing city of Florida, is located in Orange county, of which it is also the county seat, ninety miles south of Palatka, in the center of the fruit-growing district of the State. Of late years it has grown rapidly in importance, and at present (1890) has a population of 5,000. It has a courthouse, two banks, three newspapers, three hotels, several school buildings, and a large number of stores. The manufacturing interests are represented by carriage, wagon, sash, ice, and preserving factories, in addition to a foundry and machine-shop, and electric-light works.

ORLEANS, a city of France, chief town of the department of Loiret, lies on the right bank of the Loire, seventy-five miles south-southwest of Paris. At Les Aubrais, a mile to the north, is one of the chief railway junctions in the country. The chief interest of the place lies in its public buildings and the historical events of which it has been the scene. Proceeding from the railway station to the bridge over the Loire,

the visitor crosses Orleans from north to south and passes through the Place du Martroi, the heart of the city. In the middle of the square stands an equestrian statue of Joan of Arc, thirty feet high, in bronze, resting on a granite pedestal surrounded by bas-reliefs representing the leading episodes in the life of the heroine. In 1855 it took the place of an older statue executed in the beginning of the century, which was then transferred to the left bank of the Loire at the end of the bridge, a few paces from the spot where a simple cross marks the site of the *Fort des Tournelles*, captured by Joan of Arc on May 7, 1429. From the Place du Martroi, the Rue Jeanne d'Arc leads to the cathedral of Ste. Croix. This church, commenced in 1287, was burned by the Huguenots, in 1567, before its completion. Henry IV., in 1601, laid the first stone of the new structure, the building of which has continued until now. In the episcopal palace and the great seminary are several remarkable pictures and pieces of wood-carving; and the latter building has a crypt which some antiquaries hold to belong to the sixth century. The church of St. Aignan, said to have been founded by the son of Constantine, and often rebuilt, contains in a gilded and carved wooden shrine the remains of its patron saint, who occupied the see of Orleans at the time of Attila's invasion. The crypt dates from the reign of Robert the Pious (the beginning of the eleventh century). The Hôtel de Ville, built in 1530, was formerly the residence of the governors of Orleans, and was occupied by the kings and queens of France from Francis II. to Henry IV. The historical museum at Orleans is one of the most interesting of provincial collections. The city also possesses a separate picture gallery, a sculpture gallery, a natural history museum, and four learned societies. The public library (50,000 volumes) comprises among its manuscripts a number dating from the seventh century, and obtained in most cases from St. Benoît on the Loire. Among the private houses those of Agnes Sorel and Francis I., and that occupied by Joan of Arc during the siege of 1429, are of historical interest. The "White Tower" is the last representative of the towers rendered famous by that siege. Near the Quai du Châtelet a stretch of wall, dating at least from the ninth century, was discovered some years ago; it is supposed to be a portion of the *châtel* or *tête du pont* of the Roman period. The population of Orleans is 63,500.

ORLEANS, CHARLES, DUKE OF, commonly called Charles d'Orléans, was the eldest son of Louis, duke of Orleans (brother of Charles VI. of France), and of Valentina Visconti, daughter of Galeaso of Milan. He was born on May 26, 1391. He was kept a prisoner in England from the Battle of Agincourt till 1440.

The work which secures a measure of immortality to Charles d'Orléans consists wholly of short poems in the peculiar artificial meters which had become fashionable in France about half a century or more before his birth. His son, afterward Louis XII., was not born till 1462, three years before Charles' own death.

ORLEANS, DUKES OF. The title duke of Orleans was borne by three distinct dynasties of French princes of the blood. The first duke of Orleans was LOUIS (1371-1407), second son of King Charles V., who was born in 1371, and received the title from his brother Charles VI. in 1392. Both he and his son and heir played very important parts in the history of the Hundred Years' War with England (see FRANCE) in opposition to the duke of Burgundy. With his son's accession to the throne as Louis XII. the dukedom of Orleans merged in the crown. It was revived in 1626, when Louis XIII. created his brother, JEAN BAPTISTE GASTON (1608-1660), the third son of Henry IV.,

duke of Orleans and Chartres and count of Blois. He was afterward exiled to his castle of Blois, where he died without male issue in 1660. The title was at once revived by Louis XIV., who created his brother PHILIPPE (1640-1701) duke of Orleans and of Chartres, and married him to Henrietta, the sister of Charles II. of England. He left one son and three daughters: the daughters married Charles II. of Spain, Victor Amadeus II. of Savoy, and Prince Charles of Lorraine; the son was PHILIPPE (1674-1723), the regent, who has been spoken of in FRANCE.

The son of the regent, LOUIS (1703-1752), who succeeded him as duke of Orleans, played no part in politics, though his name frequently occurs in the social history of the time, and fills a great place in contemporary memoirs. Louis' son, LOUIS PHILIPPE (1725-1785), was equally averse to politics, though he served as a soldier at the battle of Dettingen; his great delight was the theater, and his place is rather in the history of the Paris green-rooms than in the history of France. But to LOUIS PHILIPPE JOSEPH (1747-1793), son of the preceding, a more adventurous life was allotted, and his part in the history of the French Revolution is one of the most difficult problems to solve of that exciting period. He was guillotined on November 6th. The execution of Philippe Egalité made the duke of Chartres, friend of Dumouriez, who was living in exile, duke of Orleans. LOUIS PHILIPPE (1773-1850) was known as the duke of Orleans throughout his long emigration and under the Restoration, and as duke of Orleans he was called upon to become king of the French in 1830. His eldest son, FERDINAND LOUIS PHILIPPE CHARLES HENRI (1810-1842), at once took the title of the duke of Orleans. He was a brave soldier, and served in Algeria from 1834 to 1836. In 1837 he married Princess Helena of Mecklenburg, and became the father of the count of Paris, who is therefore *de jure* duke of Orleans. In 1890 the count of Paris renounced his claims to the French throne in favor of his son, a young man of twenty-two, who is known as the Duc d'Orleans, who, in defiance of the decree of banishment pronounced against the family, returned to France and requested to be allowed to have an opportunity of serving as a soldier. For this offense he was promptly sentenced to two years' imprisonment.

ORME, ROBERT, author of a *History of British India*, was a son of John Orme, surgeon in Bombay, and was born at Anjengo, Travancore, in June, 1728. In 1770 he was chosen a fellow of the Society of Antiquaries. He died at Ealing January 13, 1801.

ORMONDE, JAMES BUTLER, TWELFTH EARL AND FIRST DUKE OF, was born at London on or about October 19, 1610. In 1630 he accompanied the old earl, his grandfather, to Carrick, and in 1632 succeeded him in the earldom. His active career began with the arrival of Strafford in 1633. Such was the confidence felt in him that in April, 1640, when Strafford was with Charles, he was made commander-in-chief of the forces. In August he was appointed lieutenant-general of the kingdom by Strafford. On the arrival of the news of the rebellion in 1641 he received another commission as lieutenant-general from Charles himself, and, though much hampered by the lords justices, he did admirable service in the expedition to the Naas, and in the march into the Pale in 1642, after the rebellion had drawn in the Roman Catholic gentry of English descent. On April 15, 1642, he gained the battle of Kilrush against Lord Mountgarret, and on March 18th in the following year that of Ross against Preston. In September, 1643, the civil war in England having meanwhile broken out, the opposition between Ormonde, who always stood much upon his dignity, and the lords justices, be-

came more open and acute. Ormonde threw himself unreservedly into Charles' cause, and at his command sent a body of troops into England, having first exacted an oath of loyalty from the officers (see MONK); it, however, was shortly afterward routed by Fairfax at the raising of the siege of Nantwich. On the arrival of the news of the "cessation," Charles, anxious to be quit of the Irish problem, which was complicated by the refusal of the Ulster Scots to concur in the "cessation," and desirous at the same time to see the country in safe hands, again offered Ormonde the supreme post, which he now accepted, receiving his commission in January, 1644, with special instructions to do all in his power to keep the Scotch army occupied. In all the complications of Scots, Old Irish, Catholic Irish of English race, and Protestants, and in face of the intrigues of the Pope's nuncio as well as of the attempts of the Parliament's commissioners to Ulster to ruin his power, he showed firmness and ability, and especially did his utmost to assist Antrim in his expedition into Scotland. He kept his post until the ground was cut from beneath him by Glamorgan's treaty with the Catholics in 1646, and until it was clear that he could not long hope to hold Dublin against the Irish rebels. He concluded a peace with the rebels on the basis of the free exercise of their religion, proclaimed Charles II., and upheld the royal cause with great vigor though with slight success. He was meanwhile urgent with Charles that he should come in person, but was outwitted and overborne by the Scots and their friends at the king's court. Cromwell having become irresistible, and Charles, under the influence of Argyll, having annulled the peace just concluded, Ormonde returned to France in 1650. He had meanwhile, in September, 1649, received the Garter from Charles II.

Ormonde now, though in great straits for want of money, resided in constant attendance upon Charles and the queen-mother at Paris, and accompanied the former when, on his dismissal from France, he went to Aix and Cologne. In 1658, at great risk, he went upon a secret mission into England, to gain trustworthy intelligence as to the chances of a rising, and was actively engaged in the secret transactions immediately preceding the Restoration. In the distribution of honors which followed he had a considerable share; he was at once made lord steward of the household, a privy councilor, lord-lieutenant of Somerset, high steward of Westminster, Kingston, and Bristol, chancellor of Dublin University, Baron Butler, of Llanthony, and earl of Brecknock; and on March 30, 1661, he was created duke of Ormonde in the Irish peerage, and lord high steward of England. On November 4, 1661, he once more received the lord-lieutenancy of Ireland, and was busily engaged in the settlement of that country until 1664.

In 1670, while driving through London, he was attacked and dragged out of his carriage by the well-known ruffian Blood, who had been deeply concerned in the attempt upon Dublin Castle in 1663. By whom he was set upon this deed is not known, though Ossory publicly laid it to the charge of Buckingham. Nothing appears to have saved Ormonde's life but the whim of Blood to hang him at Tyburn. The delay thus caused and Ormonde's vigorous resistance gave time for rescue. What was the mysterious connection between Blood and the court has never been discovered; but it is certain that Charles, when Blood was captured, himself asked Ormonde to pardon him.

The return of Ormonde to favor, and his appointment to the government of Ireland in 1677, were characteristic both of the times and of Charles himself. In 1682 Charles summoned Ormonde to court, and from that time retained him about his person. His first

duty was to answer, at the king's request, the memoirs published by the earl of Castlehaven, in which he had reflected upon Charles I. His vigor also during the election of aldermen and during the disputed election of sheriffs for the city after Shaftesbury's acquittal was of the greatest service to the court. On November 9, 1683, an English dukedom was conferred upon him, and in June, 1684, he returned to Ireland; scarcely, however, had he set out when intrigues against him once more proved successful, and he was recalled in October. Before, however, he could give up his government to Rochester, Charles II. died, and Ormonde's last act as lord-lieutenant was to proclaim James II. in Dublin. He lived much in retirement at Cornbury (Oxfordshire), signaling, however, his loyalty to Protestantism and the Church of England by opposing the attempts of James to assume the dispensing power, in spite of which James, to his credit, refused to take away his offices, and continued to hold him in respect and favor to the last. On Saturday, July 21, 1688, he died quietly, and was buried in Westminster Abbey.

ORMSKIRK, a market-town of Lancaster, is situated on the Lancashire and Yorkshire Railway, eleven miles northeast of Liverpool. Population, 7,000.

ORMUS. This is the European form of the name Hormuz or Hurmúz, applied to a famous city on the shores of the Persian Gulf, which occupied more than one position in the course of history, and which has now long practically ceased to exist. The earliest mention of the name occurs in the voyage of Nearchus, (325 B.C.)

ORMUZD (for Ahura-mazda or Auramazda, "the wise lord"), the good principle in the dualism of Zoroastrianism, opposed to Ahriman or Angromainyu. (See ZOROASTER.)

ORNE, a department of the northwest of France, about half of which formerly belonged to the province of Normandy and the rest to the duchy of Alençon and to Perche. Area, 2,635 square miles. The highest point in the department, situated in the forest of Écouves north of Alençon, reaches 1,378 feet. Nearly the whole department is one of the most picturesque of all France, though neither bathed by the sea nor possessing a truly mountainous character. In the matter of climate Orne belongs to the Seine region. The mean temperature is 50° Fahr.

Arable land occupies seven-twelfths of the surface, woods one-eighth, and pasture-lands almost as much. Horse-breeding is the most flourishing business in the rural districts, and the farms in the vicinity of Vimoutier, on the borders of Calvados, produce the famous Camembert cheese. Orne contains iron ore of poor quality, granite quarries employing from 400 to 500 workmen, and a kind of smoky quartz known as Alençon diamond. Its most celebrated mineral waters are those of the hot springs of Bagnoles, which contain salt, sulphur, and arsenic, and are employed for tonic and restorative purposes in cases of general debility.

The principal manufactures include ticking, table linen, furniture satin, cotton cloth, pins, needles, tinware, cutlery, boilers, articles in copper, wire, etc., in addition to which cotton and linen weaving are extensively engaged in, and the manufacture of glass gives employment to upward of 600 workmen. Besides these there are paper-mills, tanneries and glove-works, each of which employs a large force of operatives and annually produces a correspondingly large output. There are in all 133 establishments making use of steam (2,128 horse-power). There are 348 miles of railway. The department consists of four arrondissements, Alençon, Argentan, Domfront, and Mortagne, 36 cantons, and 511 communes, forms the diocese of Sées, depends on the

Caen court of appeal, and is included in the *corps d'armée* of Le Mans.

ORNITHOLOGY, in its proper sense, is the methodical study and consequent knowledge of birds with all that relates to them; but the difficulty of assigning a limit to the commencement of such study and knowledge gives the word a very vague meaning, and practically procures its application to much that does not enter the domain of science. This elastic application renders it impossible in the following sketch of the history of Ornithology to draw any sharp distinction between works that are emphatically ornithological and those to which that title can only be attached by courtesy; for, since birds have always attracted far greater attention than any other group of animals with which in number or in importance they can be compared, there has grown up concerning them a literature of corresponding magnitude and of the widest range, extending from the recondite and laborious investigations of the morphologist and anatomist to the casual observations of the sportsman or the schoolboy. The chief cause of the disproportionate amount of attention which birds have received plainly arises from the way in which so many of them familiarly present themselves to us, or even (it may be said) force themselves upon our notice. Trusting to the freedom from danger conferred by the power of flight, most birds have no need to lurk hidden in dens, or to slink from place to place under shelter of the inequalities of the ground or of the vegetation which clothes it, as is the case with so many other animals of similar size. Besides this, a great number of the birds which thus display themselves freely to our gaze are conspicuous for the beauty of their plumage; and there are very few that are not remarkable for the grace of their form. Some birds, again, enchant us with their voices, and others administer to our luxuries and wants, while there is scarcely a species which has not idiosyncrasies that are found to be of engaging interest the more we know of them. Moreover, it is clear that the art of the fowler is one that must have been practiced from the very earliest times, and to follow that art with success no inconsiderable amount of acquaintance with the haunts and habits of birds is a necessity. Owing to one or another of these causes, or to the combination of more than one, it is not surprising that the observation of birds has been from a very remote period a favorite pursuit among nearly all nations, and this observation has by degrees led to a study more or less framed on methodical principles, finally reaching the dignity of a science, and a study that has its votaries in almost all classes of the population of every civilized country. In the ages during which intelligence dawned on the world's total ignorance, and even now in those districts that have not yet emerged from the twilight of a knowledge still more imperfect than is our own at present, an additional and perhaps a stronger reason for paying attention to the ways of birds existed, or exists, in their association with the cherished beliefs handed down from generation to generation among many races of men, and not infrequently interwoven in their mythology.

Aristotle (2 v.) was the first serious author on Ornithology with whose writings we are acquainted, and though 170 sorts of birds are mentioned in his works, what is said of them on the whole amounts to very little. Next in order of date, though at a long interval, comes Caius Plinius Secundus, commonly known as Pliny the Elder, author of a very discursive *Historia Naturalis* in thirty-seven books, of which Book X. is devoted to birds. Ælian followed a century later with a compilation in Greek of a number of miscellaneous observations on the peculiarities of animals. In 1478 the *De Animalibus* of Albertus Magnus (Groot), who

died A.D. 1282, was printed, the twenty-third volume of which, *De Avibus*, contains for the first time a number of birds' names. This was followed in 1485 by the issue of a volume known as *Ortus Sanitatis* from the pen of Johann Wonnecke Von Caub, and in 1544 William Turner, a Northumbrian, printed, at Cologne, the first commentary on the birds mentioned by Aristotle and Pliny. In the same year *Dialogus de Avibus*, by Gilbertus Longolius, was printed; in 1570 Caius brought out in London *De Rariorum Animalium Atque Stirpium Historia*; meanwhile the study had received a great impulse from the appearance in Zurich of the third book of Conrad Gesner's *Historia Animalium*, and in Paris of Pierre Belon's (Bellonius) *Histoire de la nature des Oyseaux*. Ulysses Aldrovandus, a Bolognese, who wrote an *Historia Naturalium* in sixteen volumes, was a contemporary of these three men, as also was Caspar Schwenckfeld, who published at Liegnitz, in 1603, *Iberitropheum Silesiæ*, the fourth book of which consists of an "Aviarium Silesiæ," the earliest of the works we now know by the name of Fauna.

The geographical discoveries of the sixteenth century began to bear fruit, and the works of Bontius Clusius, Hernandez (or Fernandez) Marcgrave, Nieremberg, and Piso, with those of Olina and Worm, produced a marked effect, and led up to what may be deemed the foundation of scientific Ornithology, to which the joint labors of Francis Willughby and John Roy materially contributed.

In 1735 the first edition of the celebrated *Systema Natural* by Linnæus, the great reformer of Natural History, appeared; in 1745 Barrere brought out at Perpignan *Ornithologia Specimen Novum*, and in 1752 Mohring published at Aurich his *Arium Geneva*, the latter two framed on the Linnæan method, so far as it had been then reached. During the same period Mark Catesby brought out in London his *Natural History of Carolina*, two large folios containing highly colored plates of the birds of that colony, Florida and the Bahamas; Eleazar Albin produced a *Natural History of Birds* in three volumes; George Edwards completed *Gleanings in Natural History*; Brisson, six quarto volumes of the *Ornithologie*; the younger D'Aubenton began, at the suggestion of Buffon, the publication known as the *Planches Enlumineez d'Histoire Naturelle*, which appeared in two parts, illustrated with 1,008 plates all colored and nearly all representing birds. In 1770 the first volume of Buffon's *Histoire Naturelle générale et particuliere*, relating to birds, was issued, and attracted unusual notice. Buffon wielded a brilliant pen. He was the first man who formed any theory that may be called reasonable of the geographical distribution of animals, and so enlarged the purview of naturalists, that on the completion of his work upon birds in 1783, Ornithology stood in a very different position from that it had before occupied.

Great as were the services of Buffon to Ornithology in one direction, those of a similar character and of a wholly different kind rendered by John Latham, author of a *General Synopsis of Birds*; Mauderyt, who wrote the *Ornithologie* of the *Encyclopedie Methodique*; Bonnaterre, Vieillot, Müller, Scopoli, and many others must not be forgotten. In 1798 Georges Cuvier published at Paris his *Tableau Elementaire de l'Histoire Naturelle des Animaux*, and laid the foundation of a thoroughly and hitherto unknown mode of appreciating the animal kingdom. During the latter portion of the seventeenth century and the earlier years of the eighteenth century the publications devoted to Ornithology were numerous and in some instances valuable, all of which, however, yield in importance to *The Natural History of Selborne*

by Gilbert White, and Bewick's *History of British Birds*.

A series of works on Ornithology were projected and begun between 1800 and 1820, notably by Andebert, Desmarest, Temminck, Vieillot, and others, all of which were profusely illustrated. In 1827 the first part of Audubon's stupendous *Birds of America* appeared in London, followed, in 1838, by the last part. The work is contained in four volumes, illustrated by 435 plates, and has been pronounced the most magnificent work of the kind ever given to the world. Cuvier declares it to be the most magnificent monument which art has ever been called upon to erect to nature.

In 1830 John Edward Gray commenced the *Illustration of Indian Zoölogy*, but beyond the use of scientific names no text was supplied. In 1832 Mr. Lear brought out his *Illustrations of the family of Psittacides*. The same year the well-known series of illustrated ornithological works by John Gould, embracing *A Century of Birds from the Himalaya Mountains*, *The Birds of Europe*, *A Monogram of the Rhamphastidae*, etc., were commenced, many of them remaining unfinished, however, until comparatively recent years. Early in the forties an ambitious attempt to produce in England a series of colored plates on a large scale was Mr. Fraser's *Zoölogia Typica*. Failing to receive support, the publication was discontinued.

All the works mentioned above are very costly, and not easily accessible. Among the many nearly as important, but which can be passed over with briefer remark, are Swainson's *Zoölogical Illustrations*, in three volumes, the *Centurie Zoölogique* of Lesson, *Traite de Ornithologie*, by the same author, Kittlitz's *Kupfer-tafeln Zur Naturgeschichte*, Reichenboch's *Praktische Naturgeschichte der Vogel*, Shaw's *General Zoölogy*, and many other productions of the ablest of the old masters of the science.

Scarcely any of the ornithologists hitherto named indulged their imagination in theories or speculations. Nearly all were content to prosecute their labors in a plain fashion, consistent with common sense, plodding steadily onward in their efforts to describe and group the various species of birds, as one after another they were made known. But this was not always to be, and a theory was promulgated, with great zeal, by its upholders, during the end of the first and early part of the second quarter of the present century, and for some years seemed likely to carry all before it. The success it gained was doubtless due in some degree to the difficulty which most men had in comprehending it, for it was enwrapped in alluring mystery, but more to the confidence with which it was announced as being the long-looked-for key to the wonders of creation, since its promoters did not hesitate to term it the discovery of "the Natural System," though they condescended, by way of explanation to less exalted intellects than their own, to allow it the more moderate appellation of the Circular or Quinary System.

The works which come more or less under the designation of "Faunal" are very numerous, but have reference to those countries alone which form the home of English people or are commonly visited by them in ordinary travel, and the good effects of such works, especially Walters' *Birds of Ireland*, Robert Gray's *Birds of the West of Scotland*, Dunn's *Ornithologists' Guide to Orkney*, Saxtry's *Birds of Shetland*, Dillwyn's *Fauna and Flora of Swansea*, Cecil Smith's *Birds of Somerset and Birds of Guernsey*, John Hancock's *Birds of Northumberland and Durham*, and the *Vertebrate Fauna of Yorkshire*, are constantly apparent.

The more advanced school of ornithologists dates back to May, 1806, when the few scattered hints con-

tained in the "Pterographische Fragments" of Christian Ludwig Nitzsch were published in the *Magazine für den neuesten Zustand der Naturkunde*. In the following year another set of hints is contained in a memoir on fishes contributed to the tenth volume of *Annales du Museum d'histoire naturelle of Paris* by Etienne Geoffroy St. Hilaire, and in 1810 there appeared at Heidelberg the first volume of Tiedemann's carefully wrought *Anatomic und Naturgeschichte der Vogel*. More germane to the present subject, however, are the *Osteographische Beiträge Zur Naturgeschichte Vogel* of Nitzsch, his treatise on the nasal glands of birds, Naumanus' *Naturgeschichte Vogel Deutschlands*, L'Hermier's *Recherches sur l'appareil sternal des Oiseaux*, *Vollständiges Handbuch der Naturgeschichte der Vogel Europas*, or Gloger's treating of the land birds, etc., etc. The first attempt in Britain to found any scientific arrangement of birds on other than external characteristics appears to have been made about 1837, when William Macgillivray issued the first volume of his *History of British Birds*, in which, though professing "not to add a new system to the many already in partial use," he propounded a scheme for classifying the birds of Europe, at least founded on a "consideration of the digestive organs, which merit special attention on account, not so much of their great importance in the economy of birds, but because they are more obviously qualified to afford a basis for the classification of the numerous species of birds." A bolder attempt at classification was made in 1838 by Blyth, who declared that anatomy aided by physiological data, etc., was the only sure basis of classification, and his propositions in many respects anticipated conclusions that were subsequently reached and then regarded as fresh discoveries. Shortly prior to this Johann Friederich Brandt communicated a series of treatises to the Academy of Sciences at St. Petersburg, and Johannes Müller pointed out in communications to the Academy of Sciences of Berlin the value of the vocal muscles for taxonomic use.

Up to the discoveries of Wallace and Darwin classification had been little more than the shuffling of cards; after these were published, it assumed an entirely different aspect, and for the first time became something more than the expression of a fancy. The various schemes for classifying birds set forth by the authors of general textbooks of zoölogy do not call for review, as they are so drawn up as to be rather of the nature of a compromise than of a harmony.

The various groups of birds are known under the several names *Impennes Pygopodes*, asserted to be closely akin to the *Impenes Tubinares*, *Alectoide*, *Grallæ*, *Galinae*, *Pteroclidæ*, *Columbæ*, *Herodiones*, also partitioned into groups, *Ardæ*, *Ciconiæ* and *Platelæ*, *Accipitres*, *Striges*, *Picarial Passes*, *Oscines*, *Turdidæ*, etc.

There are, of course, innumerable points in regard to the classification of birds which are and for a long time will be hypothetical as matters of opinion, but others seem to stand as facts on the firm ground of proof.

ORNITHORHYNCHUS. See PLATYPUS.

ORONTES. See SYRIA.

OROPUS, a Greek seaport, on the Euripus, in the district Geiraike, opposite Eretria. It was a border city between Bœotia and Attica, and its possession was a continual source of dispute between the two countries; but at last it came into the final possession of Athens, and is always alluded to under the Roman empire as an Attic town. The actual harbor, which was called Delphinium, was at the mouth of the Asopus, about a mile north of the city. The famous oracle of Amphiaraus was situated in the territory of Oropus, twelve stadia from the city. A village still called Oropo occupies the site of the ancient town.

OROSIUS, PAULUS, author of the once widely read *Historiarum adversum Paganos Libri VII.*, was born in Spain toward the close of the fourth century. Having entered the Christian priesthood, after staying for some time in Africa as the disciple of Augustine, he was sent by him, in 415, to Palestine with a letter of introduction to Jerome, then at Bēhlehem. The ostensible purpose of his mission was that he might gain further instruction from Jerome on the points raised by the Priscillianists and Origenists; but in reality to stir up and assist Jerome and others against Pelagius, who, since the synod of Carthage in 411, had been living in Palestine, and finding some acceptance there. The result of his arrival was that John, bishop of Jerusalem, was induced to summon at his capital in June, 415, a synod at which Orosius communicated the decisions of Carthage and read such of Augustine's writings against Pelagius as had at that time appeared. All that Orosius succeeded in obtaining was John's consent to send letters and deputies to Innocent of Rome; and, after having waited long enough to learn the unfavorable decision of the synod of Diospolis or Lydda in December of the same year, he returned to north Africa, where he is believed to have died.

ORPHEUS, a very important figure in Greek legend, was son of the river god Cægrus and the muse, Calliope. He played so divinely on the lyre that all nature stopped to listen to his music. When his wife, Eurydice, died, he went after her to Hades, and the strains of his lyre softened even the stern gods of the dead. Eurydice was released, and followed him to the upper world, but he looked back toward her before she was clear of the world of death, and she vanished again from his sight.

The name of Orpheus is equally important in the religious history of Greece; and in this respect also it is associated with Thrace. He was the mythic founder of a religious school or sect, with a code of rules of life which prescribed abstinence from beans, flesh, certain kinds of fish, etc., the wearing of a special kind of clothes, and numerous other practices and abstinences, for all of which reasons were given in religious myths. The ritual of worship was peculiar, not admitting bloody sacrifices. The belief was taught in the homogeneity of all living things, in the transmigration of souls, in the view that the soul is imprisoned in the body, and that it may gradually attain perfection through connection with a series of bodies.

ORPIMENT (*auripigmentum*), the trisulphide of arsenic, or yellow realgar, occurs in small quantities as a native mineral of a brilliant golden-yellow color in Bohemia, Peru, etc. For industrial purposes an artificial orpiment is manufactured by subliming one part of sulphur with two of arsenious acid. These artificial preparations all contain free arsenious acid, and are therefore highly poisonous. Formerly, under the name of king's yellow, a preparation of orpiment was in considerable use as a pigment, but now it has been largely superseded by chrome-yellow.

ORRERY, EARLS OF. See BOYLE.

ORRIS-ROOT consists of the rhizomes or underground stems of three species of *Iris*, *I. germanica*, *I. florentina*, and *I. pallida*, closely allied plants growing in subtropical and temperate latitudes, but principally identified with North Italy. In its fresh condition orris-root contains an acrid juice and has an earthy odor, but it is quite destitute of the fragrance which ultimately characterizes the substance, and which develops fully only after a lapse of about two years, probably by fermentation. By distillation with water a crystalline body known as orris-camphor or oil of orris, possessing the fragrant properties of orris-root, is ob-

tained. Orris-root has been a well-known and esteemed perfume from early Greek times. It is principally powdered for use in dentrifices and other scented dry preparations; but to some extent the crude oil is distilled for general perfumery purposes. It is also used in small pellets as issue peas.

ORSINI, FELICE, Italian patriot, was born in December, 1819, at a small town in the Roman states not far from Forli. He was educated for the church, but soon abandoned that career, and joined Mazzini's Young Italian Society in 1838. For engaging in revolutionary projects he was arrested May 1, 1844, and sentenced at Rome to the galleys for life, but by the amnesty proclaimed on the accession of Pius IX. he was restored to liberty. In 1848 he became leader of a band of youthful Romagnoli, and in 1849 he was chosen a deputy to the Roman parliament, and while engaged in a mission to Hungary he was, in December, 1854, arrested at Hermannstadt and imprisoned at Mantua. A few months afterward he made his escape by sawing through the bars of his cell. Some time after a rupture with Mazzini he went to Paris with the determination to assassinate Napoleon III. While the emperor and empress were returning from the opera on the evening of January 14, 1858, bombs were exploded at their carriage, but without inflicting any injury on either. In the attempt Orsini had three associates, Pieri, Rudio, and Gomez. Gomez was pardoned, the sentence against Rudio was commuted on the scaffold, but Orsini and Pieri were executed March 13, 1858. (See FRANCE.)

ORSK (*Yaman-kala* of the Kirghiz), a district town of Orenburg, Russia, 155 miles to the east-southeast of the capital of the government, on the right bank of the Ural, was originally founded in 1735 as the principal Russian fort against the attacks of the Kirghiz. The population, only 6,000 some fifteen years ago, reached 14,350 in 1880, and has since become larger.

ORTELIUS, ORTELL, or OERTEL, ABRAHAM, next to Mercator the greatest geographer of his age, was born at Antwerp in 1527, and died in the same city on June 28, 1598. His *Theatrum Orbis Terrarum*, published at Antwerp in 1570, and reissued in a revised form five times during his lifetime, was the first modern atlas. Most of the maps were admittedly reproductions, and no attempt was made to reconcile discrepancies of delineation or nomenclature. To the modern eye even England and Scotland appear with amusing distortions; but, taken as a whole, the noble folio, with its well-nigh one hundred maps, and its careful accompaniment of text, was a monument of rare erudition and industry; and the author well deserved the appointment to be cosmographer to Philip II. bestowed upon him in 1575.

ORTHONYX, the scientific name given in 1820, by Temminck, to a little bird, which, from the straightness of its claws, its large feet and spiny tail, he judged to be distinct from any other form.

The typical species of Orthonyx—for the scientific name has been adopted in English—is rather larger than a skylark, colored above not unlike a hedge-sparrow. The wings are, however, barred with white, and the chin, throat, and breast are in the male pure white, but of a bright reddish-orange in the female. The remiges are very short, rounded, and much incurved, showing a bird of weak flight. The rectrices are very broad, the shafts stiff, and toward the tip divested of barbs.

ORTOLAN, the *Emberiza hortulana* of Linnæus, a bird so celebrated for the delicate flavor of its flesh as to have become proverbial. A native of most European countries—the British Islands excepted—as well as of western Asia, it emigrates in autumn presumably to the southward of the Mediterranean, though its winter quarters cannot be said to be accurately known, and

returns about the end of April or beginning of May. In appearance and habits it much resembles its congener the YELLOW-HAMMER (*q.v.*), but wants the bright coloring of that species, its head, for instance, being of a greenish-gray instead of a lively yellow. In Europe the *Beccafico* (Figeater) shares with the Ortolan the highest honors of the dish, and this may be a convenient place to point out that the former is a name of equally elastic signification. The true *Beccafico* is said to be what is known in England as the Garden-Warbler (the *Motacilla salicaria* of Linnæus, the *Sylvia hortensis* of many writers); but in Italy any soft-billed small bird that can be snared or netted in its autumnal emigration passes under the name in the markets and cook-shops. The "Beccafico," however, is not as a rule artificially fattened, and on this account is preferred by some sensitive tastes to the Ortolan.

ORVIETO, a town in Umbria, Italy, on the main road from Florence to Rome, situated on an almost isolated volcanic rock, about 770 feet above the plain. It is now the capital of a province, the seat of a bishop, and in 1889 had a population of 9,600. Owing to the strong Guelphic sympathies of the inhabitants, and the inaccessible nature of the site, Orvieto has been constantly used as a place of refuge by the popes, of whom no less than thirty-two have at different times found shelter there. The town is very picturesque, both from its magnificent position and also from the unusually large number of fine thirteenth-century houses and palaces which still exist in its streets. The chief glory of the place is its splendid cathedral, dedicated to the Virgin; it was founded in 1290, by Nicholas IV., on the site of an older church; it was designed by Lorenzo Maitani, a Siennese architect, and from the thirteenth till the sixteenth century was enriched by the labors of a whole succession of great Italian painters and sculptors (see ORCAGNA).

OSAGE ORANGE (*Maclura aurantiaca*), also known by the name Bois d'Arc, is a tree growing to the height of fifty feet and exceptionally prolific in the Red River Valley of the Indian Territory, of which it is a native, also in portions of Arkansas and Texas. The wood is of a bright orange color, close grained, strong and flexible, of a satiny surface and susceptible of a beautiful polish. It is very durable and is used for fenceposts, wheel-stock, railway ties, also for hedges in various parts of the country, and when cared for serves this purpose excellently.

ORYEKHOFF-ZUYEFF, ORYEKHOVSKIY POST, a village of European Russia, in the Pokroff district of the Vladimir government, twelve miles west of Pokroff by rail, on the Klyazma, a tributary of the Volga. A great cotton factory in the vicinity has become the center of a new town, which is called after the village, but also frequently Nikolskoye. About 12,600 hands are employed in the cotton manufacture itself, and about 6,000 in digging peats and making bricks for the firm.

OSBORN, SHERARD, English admiral and explorer, was the son of Lieutenant-Colonel Osborn of the Madras army, and was born April 25, 1822, and entered the navy as a first-class volunteer in 1837. On account of his interest in the fate of many of his friends and messmates, he took a prominent part in advocating a new search expedition for Sir John Franklin. When it was agreed upon he was appointed to the command of one of the ships, and performed a remarkable sledge journey to the western extremity of Prince of Wales Island. In the new expedition fitted out in the spring of 1852 he also took part as commander of the *Pioneer*, and, after spending two trying winters up Wellington Channel, returned home in 1855. Shortly after his return

he was called to active service in connection with the Russian war. In 1859 he returned to England in broken health, and to support his family engaged in literary pursuits, contributing many important articles to *Blackwood's Magazine*, and publishing, in December of that year, *The Career, Last Voyage, and Fate of Sir John Franklin*. In 1873 he was promoted rear-admiral. Continuing to interest himself in Arctic exploration, he induced A. H. Markham to visit Baffin's Bay in a whaler to report on the possibility of ice-navigation with the aid of steam. A record of his observations was published under the title of a *Whaling Cruise to Baffin's Bay in 1873*, with the result that a new Arctic expedition was fitted out in 1874. Osborn died May 6, 1875.

OSCANS, or OPICANS, was the name given by both Greeks and Romans to one of the ancient nations of central Italy. No mention occurs of the Oscans among the populations of Italy that were successively reduced by the Roman arms; but we learn incidentally from a passage in Livy that the language of the Samnites and Campanians was Oscan; and it is certain that this continued to be the vernacular tongue of the people of Italy until long after the Roman conquest. Of the ethnical affinities or origin of the Oscans we know nothing. Perhaps the most plausible theory is that they were, in very early times, the inhabitants of the regions subsequently occupied by a race of invaders from the north, who were known as Sabines, Samnites, and Sabellians, but who, being comparatively few in numbers, and in an inferior stage of civilization, gradually adopted the language of the conquered race.

OSHKOSH, the second city commercially and in respect to its population in Wisconsin, and the county seat of Winnebago county, is located on both banks of Fox river at its junction with Lake Winnebago. The city is eighty-five miles northwest of Milwaukee, forty-nine miles southwest of Green Bay and seventeen miles northwest of Fond du Lac. The ground upon which the city is built slopes gradually to the lake and river, affording excellent drainage facilities, and its means of communication with territory adjoining and distant are complete and comprehensive. The earliest settlement made upon the site of the city was in 1836. Its incorporation was of date April, 1859, and its progress since has been gradual but substantial, notwithstanding its partial destruction by fire in 1859 and 1874, and finally on April 28, 1875. It contains a courthouse, State normal school, State asylum for the insane, a high school, eight district and eight parochial schools, twenty-five churches, three public halls, two opera-houses, a public library, three national banks, one State bank, two daily and five weekly newspapers, and five hotels. The chief industry is the manufacture of lumber, in which there are employed twenty sawmills with a total capacity of 80,000,000 feet annually, five planing and a number of shingle mills. In addition to these, there are several carriage factories, five breweries, four machine-shops, three foundries, two tanneries, a shipyard, and one of the largest match factories in the world. The chief articles of export are pine lumber, wheat flour and other commodities. The city is lighted by gas and electricity, and water is obtained from artesian wells by means of the Holly system. The Chicago and North-Western, Chicago, Milwaukee and St. Paul, Wisconsin Central and Milwaukee, Lake Shore and Western railroad enter the city, where they occupy separate depots, and a direct water-route between Lake Michigan and the Mississippi is formed by the junction of Lake Winnebago with the Fox and Wisconsin rivers. The assessed valuation of property is upward of \$10,000,000, and the population of 1889 was 22,753.

OSIANDER, ANDREAS, German Reformer, was born at Gunzenhausen, near Nuremburg, on December 19, 1498. After studying at Leipsic, Altenburg, and Ingolstadt, he was ordained, in 1520, to the priesthood. Two years afterward he was appointed preacher in the St. Lorenz Kirche, and about the same time he publicly joined the Lutheran party, taking a prominent part in the discussion which ultimately led to the adoption of the Reformation by the city. As a theologian, he was present at the Marburg conference in 1529, at the Augsburg diet in 1530, and at the signing of the Smalkald articles in 1537, and took part in other public transactions of importance in the history of the Reformation. The introduction of the Augsburg Interim in 1548 necessitated his departure from Nuremburg; he afterward settled at Königsberg as professor in the new university there. In 1550 he published two disputations, the one *De Lege et Evangelio*, and the other *De Justificationes*, which aroused a vehement controversy that was not brought to a close by his death, October 17, 1552.

OSIRIS. See EGYPT.

OSKALOOSA, a city of the United States, capital of Mahaska county, Iowa, about fifty-five miles southeast of Des Moines. It lies on high ground between the Des Moines and the South Skunk, in a fine agricultural district, with coal and iron mines in the vicinity; and it contains two colleges—Oskaloosa College (1861), belonging to the "Disciples," and Penn College (1873), a Quaker institution—flourmills, wool-factories, iron and brass foundries, lumber-yards, etc., and an artesian well 2,900 feet deep. The population, 3,204 in 1870 and 4,598 in 1880, is stated by the 1890 census at 7,300.

OSMAN. This transcription of the Arabic name 'Othmān (which first appears in history as borne by the famous companion of Mohammed, and third caliph) (see MOHAMMEDANISM), corresponds to the pronunciation of the Persians and Turks, and is therefore commonly used in speaking of Osman I. Ghāzi, the founder of the dynasty of Osmanli or Ottoman Turks. He took the title of sultan in 699 A.H. (1299 A.D.), ruled in Asia Minor, and died in 726 A.H. Osman II., the sixteenth Ottoman sultan, came to the throne in 1616 A.D., and was strangled in a sedition of the Janissaries in 1621. (See TURKEY.)

OSMIUM. See PLATINUM.

OSNABRÜCK, a prosperous manufacturing town of Prussia, the see of a Roman Catholic bishop, and the capital of a district of its own name in the province of Hanover, is pleasantly situated on the Hase, seventy miles to the west of the town of Hanover.

Osnabrück contains (1890) 34,812 inhabitants, one-third of whom are Roman Catholics. The patriotic writer and philanthropist Julius Möser (1720-94) was a native of Osnabrück, and has a statue in the cathedral square.

OSORIO, GERONYMO, "the Cicero of Portugal," belonged to a noble family, and was born at Lisbon, in 1506. After studying languages at Salamanca, philosophy at Paris, and theology at Bologna, he rose through successive ecclesiastical dignities to the bishopric of Sylves. He evaded the necessity of accompanying Dom Sebastian on his first African expedition, only by setting out for Rome, where he was well received by Gregory XIII. The disaster which overtook the Portuguese arms at Alcazarquivir in 1578 had a serious effect on Osorio's health and spirits; he withdrew into solitude, and died at Tavira, on August 20, 1580.

OSPNEY, or OSPRAY, a word said to be corrupted from "Ossifrage," in Latin *Ossifraga* or bone-breaker. The *Ossifraga* of Pliny and some other classical writers seems, as already said, to have been the LÄMMERGEYER

(*q.v.*); but the name, not inapplicable in that case, has been transferred—through a not uncommon but inexplicable confusion—to another bird which is no breaker of bones, save incidentally those of the fishes it devours. The Osprey is a rapacious bird, of middling size and of conspicuously-marked plumage. It is the *Falco haliæetus* of Linnæus, but unquestionably deserving generic separation was, in 1810, established by Savigny as the type of a new genus which he was pleased to term *Pandion*—a name since pretty generally accepted. Though migratory in Europe at least, it is generally independent of climate. It breeds equally on the shores of Hudson's Bay, on the cays of Honduras, in the dense forests of Finland and on the barren rocks of the Red Sea, in Kamchatka and in West Australia. Where, through abundance of food, it is numerous—as in former days was the case in the eastern part of the United States—the nests of the Fish-Hawk (to use its American name) may be placed on trees to the number of three hundred close together. Where food is scarcer and the species accordingly less plentiful, a single pair will occupy an isolated rock, and jealously expel all intruders of their kind, as happens in Scotland.

OSRHOENE, or ORRHOENE, the district of western Mesopotamia of which Edessa was the capital. (See MESOPOTAMIA.)

OSSETT-CUM-GAWTHORPE, a township and urban sanitary district in the West Riding of Yorkshire, England, is situated about three miles west-northwest of Wakefield, and one and a half northwest from the Horbury station on the Lancashire and Yorkshire Railway. The Great Northern Railway has two stations in the township. The church of the Holy Trinity, a fine cruciform structure in the Early Decorated style, was erected in 1865 at a cost of \$100,000. There are woolen cloth and mungo mills, and in the neighborhood extensive collieries. The population of the township (3,105 acres) in 1871 was 9,190, in 1881 it was 10,957, and estimated at 12,000 in 1890.

OSSIAN, or OISIN. See CELTIC LITERATURE and GAELIC LITERATURE.

OSSOLI, SARAH MARGARET FULLER, MARCHIONESS, an American authoress, was the eldest child of Timothy Fuller, a lawyer and politician of some eminence, and was born at Cambridgeport, Mass., May 23, 1810. Her education was conducted by her father. Having made herself familiar with the masterpieces of French, Italian, and Spanish literature, she, in 1833, began the study of German, and within the year had read some of the masterpieces of Goethe, Körner, Novalis, and Schiller. Her father dying in 1835, she went, in 1836, to Boston to teach languages, and in 1837 she was chosen principal teacher in the Green Street school, Providence, R. I., where she remained till 1839. From this year until 1844 she stayed at different places in the immediate neighborhood of Boston, forming an intimate acquaintance with the colonists of Brook Farm, and numbering among her closest friends R. W. Emerson, Nathaniel Hawthorne, and W. E. Channing. In 1839 she published a translation of Eckermann's *Conversations with Goethe*, which was followed, in 1841, by a translation of the *Letters of Günderode and Bettina*. Aided by R. W. Emerson and George Ripley, she, in 1840, started *The Dial*, a poetical and philosophical magazine representing the opinions and aims of the New England Transcendentalists. In 1844 she removed to New York to become contributor to *The Tribune*, and in 1846 she published a selection from her criticisms on contemporary authors in Europe and America, under the title *Papers on Art and Literature*. The same year she paid a visit to Europe, passing some time in England and France, and finally

taking up her residence in Italy. There she was married, in December, 1847, to the Marquis Giovanni Angelo Ossoli, a friend of Mazzini. During 1848-49 she was present with her husband in Rome, and when the city was besieged she, at the request of Mazzini, took charge of one of the two hospitals while her husband fought on the walls. In May, 1850, along with her husband and infant son, she embarked at Leghorn for America, but when they had all but reached their destination the vessel was wrecked on Fire Island beach, and the Ossolis were among the passengers who perished.

OSTADE. The Ostades are Dutch painters of note, whose ancestors were settled at Eyndhoven, near the small village of Ostaden, from which they took their name. Early in the seventeenth century Jan Hendrickx, a weaver, moved with his family from Eyndhoven to Haarlem, where he married and founded a large family. The eldest and youngest of his sons became celebrated artists.

I. ADRIAN OSTADE, the first of Jan Hendrickx's boys, was born at Haarlem about December 10, 1610, when he was christened in presence of several witnesses. His death took place on April 27, his burial on May 2, 1685, at Haarlem. According to Houbraken he was taught by Franz Hals, at that time master of Adrian Brouwer. He took the highest honors of his profession, the presidency of the painters' guild at Haarlem, in 1652. The number of Ostade's pictures is given by Smith at 385. It is probable that he painted many more. At his death the stock of his unsold pieces was over 200.

II. ISAAC OSTADE was christened on June 2, 1621, at Haarlem. He began his studies under Adrian, with whom he remained till 1641, when he started on his own account. At an early period he felt the influence of Rembrandt, and this is apparent in a *Slaughtered Pig* of 1639, in the gallery of Augsburg. But he soon reverted to a style more suited to his pencil. He produced pictures in 1641-42 on the lines of his brother—among these, the *Five Senses*, which Adrian afterward represented by a *Man Reading a Paper*, a *Peasant Tasting Beer*, a *Rustic Smearing his Sores with Ointment*, and a *Countryman Sniffing at a Snuff-box*. A specimen of Isaac's work at this period may be seen in the *Laughing Boor with a Pot of Beer*, in the museum of Amsterdam. But the low price fixed by the guild of Haarlem induced Isaac to give up the practice, in which he could only hope to remain a satellite in the orbit of Adrian, and accordingly we find him gradually abandoning the cottage subjects of his brother for landscapes in the fashion of Esaias Van de Velde and Solomon Ruysdael. Isaac's progress in the new path was greatly facilitated by his previous experience as a figure painter; and, although he now selected his subjects either from village high streets or frozen canals, he was enabled to give fresh life and animation to the scenes he depicted by groups of people full of movement and animation, which he relieved in their coarse humors and sordid appearance by a refined and searching study of picturesque contrasts. He died at twenty-eight, on October 16, 1649.

OSTASHKOFF, a town of Tver, Russia, 163 miles by rail southeast from the capital of that government, on Lake Seliger, has a population of 12,500.

OSTEND, a seaport of Belgium, in the province of West Flanders, seventy miles west-northwest from Brussels, is surrounded on the north and west by the sea; its site is an extensive plain, lying below high-water level, the town and surrounding country being protected by a sea-wall built of granite with a brick revetment, upon which the waves generally exhaust their force

even in the roughest weather. The port is dangerous in unfavorable weather; the channel leading into the two interior basins (which are calculated to hold more than a thousand vessels) is formed by two long wooden piers, and at its mouth has a width of only 165 yards. At the northwest extremity of the sea-wall is a lighthouse erected in 1771, and subsequently modernized, with a light visible at a distance of forty-five miles. The town has an active trade in refined salt, ropes, sails, soap, tobacco, lace, and wool. The imports greatly exceed the exports. In 1889 1,345 vessels entered with 175,987 tons cargo, and 1,342 cleared with 32,010. In 1880 the population of the town was 16,823, and is estimated at 20,000 in 1890.

OSTERVALD, JEAN FRÉDÉRIC, Swiss Protestant theologian, was born at Neuchâtel on November 25, 1663, educated at Zurich and at Saumur (where he graduated), studied theology at Orleans, Paris, and Geneva, and was ordained to the ministry in his native place in 1683. As preacher, pastor, lecturer, and author, he attained a position of great influence in his day. He died on April 14, 1747.

OSTIA, a city of ancient Latium, situated at the mouth of the Tiber, from which circumstance it obviously derived its name, became from an early period the port of Rome. As the wealth and importance of Rome itself increased, the prosperity of Ostia naturally rose with it, and it continued throughout the period of the Roman republic to be at once the principal emporium of trade in this part of Italy and the permanent station of the Roman fleet. At the close of the western empire Ostia itself, which was unprotected by walls, and consequently exposed to the attacks of the barbarians, fell into decay; and after it was plundered by the Saracens in the ninth century the site became altogether abandoned, the modern village of Ostia being situated at a distance of about half a mile from the ruins of the ancient city. The extent and variety as well as the beauty of the works of art discovered on the site confirm the accounts given by ancient writers of the opulence and prosperity of Ostia in the days of the empire.

OSTIAKS, or OSTYAKS, a tribe of Finnish origin, who inhabit the basin of the Obi in western Siberia; a few hundreds also are nomads in the basin of the lower Yenisei. During the Russian conquest their abodes extended much farther south than now, and they had numerous settlements on the basin of the Obi. Remains of these "towns" are still to be seen at the Kunovat river on the Obi twenty miles below Obdorsk, and elsewhere. The total number of the Ostiaks may be estimated at a little over 27,000. Those on the Irtysh are mostly settled, and have adopted the manner of life of Russians and Tartars. Those on the Obi are mostly nomads; along with 8,000 Samoyedes in the districts of Beryozoff and Surgut, they own 93,600 reindeer. They live almost exclusively by fishing, buying from Russian merchants corn for bread, the use of which has become widely diffused.

The Ostiaks are middle-sized, or of low stature, mostly meager, and not ill made, however clumsy their appearance in winter, in their thick fur clothes. The extremities are fine, and the feet are usually small. The skull is brachycephalic, mostly of moderate size and height. The hair is dark and soft for the most part, fair and reddish individuals being rare; the eyes are dark, generally narrow; the nose is flat and broad; the mouth is large and with thick lips; the beard is scanty. The younger men and women are sometimes of an agreeable appearance. The Mongolian type is more strongly pronounced in the women than in the men. On the whole, the Ostiaks are not a pure race; the purest type is found among the fishers on the Obi, the

reindeer-breeders of the tundra being largely intermixed with Samoyedes (see Castrén; Dr. Finsch's *Reise nach West-Sibirien*, etc.)

Investigators are unanimous in describing them as very kind, gentle and honest; rioting is almost quite unknown among them, as also theft, this last occurring only in the vicinity of Russian settlements, and the only penalty enforced being the restitution twofold of the property stolen. The farther they are removed from contact with Russian dealers and traders the higher do their moral qualities become.

OSTRACISM, a peculiar political institution in Athens, designed by Clisthenes as a safeguard against any citizen acquiring too great power and aspiring to make himself tyrant of the state. Before it could be carried into effect, a decree of the people had to be passed that an ostracism was necessary. If this was done, the voting was fixed for a special day in the agora. The person who obtained the majority was exiled for ten years, provided the votes against him were 6,000. If no person were designated on so many shells, the proceedings were at an end. The ostracized person might return at the end of his term of banishment, having then the full rights of citizenship, or his term might be shortened by a special vote of the people. The institution was intended as a precaution in view of the weakness of the central government, which, having no standing army at its disposal, was liable to be disturbed or overturned by a sudden attack arranged by a powerful partisan. The same institution is said to have been in use at Argos, Miletus, and Megara, and a similar one called *petalismus* was employed at Syracuse for a short time during the fifth century B.C.; the latter was named from the olive leaves used instead of oyster-shells.

OSTRICH (old English, *Estridge*; Latin, *Avis struthio*). Among exotic birds there can be hardly one better known by report than the strange, majestic, and largest of living birds, whose size is not insignificant in comparison even with the mightiest of the giants that of old existed upon the earth, since an adult male will stand nearly eight feet in height, and weigh 300 pounds. As with most birds, the Ostrich is disappearing before the persecution of man, but there are many districts, some of wide extent, known to have been frequented by the Ostrich within the present century, especially toward the extremities of its African range—on the borders of Egypt and the Cape Colony. It is probable that it still lingers in the wastes of Kirwan in eastern Persia, whence examples may occasionally stray northward to those of Turkestan, even near the Lower Oxus. Apparently the most northerly limit of the Ostrich's ordinary range at the present day cannot be further than that portion of the Syrian Desert lying directly to the eastward of Damascus; and within the limits of what may be called Palestine. Africa, however, is still, as in ancient days, the continent in which the Ostrich most flourishes, and from the confines of Barbary to those of the European settlements in the south it appears to inhabit every waste sufficiently extensive to afford it the solitude it loves, and in many wide districts, where the influence of the markets of civilization is feebly felt, to be still almost as abundant as ever.

The Ostrich was first introduced into the United States for breeding purposes in 1882. Years ago the attention of a commissioner of agriculture was called to this industry, and though he tried to interest the government in the enterprise, nothing came of such efforts. In the year above mentioned, however, a troop of 200 picked ostriches were started from Cape Town on their way to South America. After a tedious voyage they arrived at New York in December, whence they

were shipped overland to California, where twenty-two of them arrived and were at once taken to Anaheim, where the ranch of the California Ostrich Company is located. About the same time the American Ostrich Company was organized in Maine, with E. J. Johnson as manager. He visited Africa and spent a year in studying the habits of these birds. He arrived in New Orleans on his return, having twenty-three birds, with which he proceeded to San Diego, Cal., thence removing to the valley of the San Luis Rey, where the second ostrich farm in the United States was established. There are now several places where ostriches may be seen in California. The effect of acclimation was very trying to some of the birds imported, but the success of the pioneer enterprise in America has been such as to encourage similar ventures at other points. Whether ostrich farming will become a pronounced success in portions of America, time and experience alone can determine. Where the effort has been made, as already indicated, gratifying results have followed. Possibly when the birds become acclimated, so that they will lay and hatch in the hot months, they may be found to flourish, even in the more northern States.

OSTUNI, a city of Italy, in the province of Lecce, twenty-three miles by rail northwest of Brindisi. It is a bishop's see, has a cathedral of the fifteenth century with a fine Romanesque façade, several other churches of some interest, a municipal library with a collection of antiquities, and a technical school. The population was 14,422 in 1871 and 15,199 in 1881, and estimated at 17,500 in 1890.

OSUNA, a town of Spain, in the province of Seville, distant forty-eight miles by road and fifty-seven by rail east-southeast from that city, is built in a semicircular form on the slope of a hill, at the edge of a fertile plain watered by the Salado, a sub-tributary of the Guadalquivir. The population of the ayuntamiento in 1877 was 17,211 and about 18,275 in 1889.

OSWALD, "most Christian king of the Northumbrians," was the son of King Ethelfrith, and born about 604. On the death of his father on the battlefield in 617, he and his brothers were compelled to take refuge among the northern Celts, where they are said to have received baptism. Oswald was called to the throne of the united kingdoms, and established his claim to it by his great victory over Ceadwalla at Heavenfield, near Hexham, in 635. His beneficent reign, which was devoted chiefly to the establishment of Christianity throughout his dominions, was brought to an end by his defeat and death on August 5, 642 (see NORTH-UMBERLAND). Oswald, bishop of Winchester, who died February 29, 992, is also commemorated as a saint (October 15th).

OSWALDTWISTLE, a township of Lancashire, England, on the Leeds and Liverpool Canal and the East Lancashire Railway, three and one-half miles east-southeast of Blackburn and twenty-four north of Manchester. It possesses cotton-mills, printworks, bleach-works, and chemical works, and in the neighborhood there are collieries, stone quarries, and potteries. The population of the township and urban sanitary district (area 4,883 acres) in 1871 was 10,283, in 1881 it was 12,206, and estimated at about 14,000 in 1890.

OSWEGO, a city and port of entry of the United States, capital of Oswego county, N. Y., stretches between two and three miles along the southeast shore of Lake Ontario, on the low bluffs and hilly ground near the mouth of the Oswego river, which divides it into two nearly equal portions, and is spanned by three iron drawbridges. By the Delaware, Lackawanna and Western Railroad it is 305 miles from New York, and

by the New York, Ontario and Western Railroad 326 miles. The Oswego Canal connects at Syracuse with the Erie Canal. The situation of the city is a beautiful and healthful one: most of the streets are 100 feet wide, and there are two finely-shaded public parks, one on each side of the river. Among the more conspicuous buildings are the conjunct custom-house, postoffice, and United States courthouse, erected in 1858 at a cost of \$120,000, the city-hall, the county courthouse, the State armory, the church of the Evangelists, the large Roman Catholic Church on Mohawk street, the public library (10,000 volumes), the normal and training schools, the city almshouse (two miles outside the city limits), and the orphan asylum. Falling thirty-four feet in its passage through the city, Oswego river furnishes a good supply of water-power, rendered available by a canal on each side. Besides the Oswego starch factory (founded in 1848 and now probably the largest in the world, occupying ten acres of ground, partly with fireproof buildings seven stories high, and producing thirty-five tons of starch daily), the manufactories of Oswego comprise flourmills, large ironworks (making steam-engines, steam shovels, dredges, etc.), knitting-works, shade-cloth factories, railway carriage works and repair shops, box factories, planing-mills, and a large number of subsidiary establishments. In the extent of its trade Oswego is the principal United States port on Lake Ontario, importing vast quantities of grain and timber, and exporting coal, flour, and salt. The annual duties on imports average over \$1,000,000. The inner harbor, formed by the river mouth being enclosed by jetties, has about three miles of wharfage, and a depth at low water of from nine to thirteen feet; and the outer harbor, formed by the construction, since 1871, of a breakwater 5,700 feet long, has about four miles of wharfage, and a depth of twenty feet. Fort Ontario, rebuilt by the United States Government in 1839, guards the entrance to the harbor; it is a place of some strength. The population of Oswego was 12,205 in 1850, 20,910 in 1870, 21,112 in 1880, and 21,842 in 1889.

Oswego was visited by Champlain in 1615, by the Jesuits Le Mayne in 1654, and by other early explorers. In 1722 the English established a trading-post here, and in 1727 Gov. William Burnet (son of Bishop Burnet) erected Fort Oswego. A body of about 700 men, left here by Governor Shirley, constructed in 1755-56 two other forts—Fort Ontario on the east, and Oswego New Fort on the west side of the river. In 1756 the place was bombarded and captured by Montcalm; but between 1757 and 1759 new works were constructed by the English, who kept possession till Oswego was transferred to the United States by the Jay treaty in 1796. In 1814 Sir James Yeo took the fortress after a bombardment of three hours. The little hamlet of Oswego, commenced by Neil McMullen, rapidly increased after the introduction of steam navigation on the lake (1816) and the construction of the Welland and the Oswego Canals (1828). In 1828 it was incorporated as a village, in 1848 as a city.

OSWESTRY, a market-town and municipal borough in Shropshire, England, on the borders of Wales, on two railway lines and near the Shropshire Canal, eighteen miles northwest of Shrewsbury and sixteen north from Welshpool. The population of the municipal borough (area 1,888 acres) in 1871 was 7,306, in 1881 it was 7,847, and in 1889 is estimated at about 8,500.

OTAGO. See NEW ZEALAND.

OTAHEITE, or TAHITI. See SOCIETY ISLANDS.

OTHO, MARCUS SALVIUS, Roman emperor from January 15 to April 15, 69 A.D., was born April 28.

32 A.D. He belonged to an ancient and noble Etruscan family, settled at Ferentinum, in Etruria. Otho himself first appears in history as one of the most reckless and extravagant of the young nobles who surrounded Nero and shared his revels. But his friendship with that emperor was brought to an abrupt close, when Otho was only twenty-six years old, by his refusal to divorce his beautiful wife Poppæa Sabina at the bidding of Nero, who was enslaved by her charms. The emperor at once removed Otho from the scene by appointing him governor of the remote province of Lusitania. When, in 68, his neighbor Galba, the governor of Hispania Tarraconensis, rose in revolt against Nero, Otho at once joined him and accompanied him to Rome. Galba was far advanced in years, and Otho, encouraged by the predictions of astrologers, aspired to succeed him. With this object in view, he set himself to win the affections of the soldiery and the populace in Rome, who, disgusted by Galba's old-fashioned parsimony and severity, were easily brought to look favorably upon a claimant for the imperial purple whose open-handed generosity and easy manners promised a return of the golden years of Nero. But in January, 69, his hopes in this direction were dissipated by Galba's formal adoption of L. Calpurnius Piso to succeed him. Nothing now remained for Otho but to strike a bold blow for the prize which seemed to be slipping from his grasp. On the morning of January 15th, five days only after the adoption of Piso, Otho attended as usual to pay his respects to the emperor, and then hastily excusing himself on the score of private business hurried from the Palatine to meet his slender band of accomplices in the Forum. By them he was escorted to the prætorian camp, where, after a few moments of surprise and indecision, he was saluted imperator by the assembled troops. The cohort on duty at the Palatine, which had accompanied the emperor, instantly deserted him; Galba himself was brutally murdered by the fierce prætorians, and his fate was shared by his adopted heir Piso, and by his chief confidants and advisers. The brief struggle over, Otho returned in triumph to the camp. Toward sunset on the same day he proceeded to the senate-house, and there was duly invested by the senators with the name of Augustus, the tribunician power, and the other dignities belonging to the principate. The year following he was defeated by Vitellius, commander of the legions of the Lower Rhine, at battles at Cremona and Brixellum, and early in the morning of April 15, A.D. 69, he died by his own hand.

OTHO I., called the Great, Holy Roman emperor, was born in 912. After the death of his father, Henry, king of Germany, he was elected and crowned king in 936 at Aix-la-Chapelle; and he occupied the throne upward of thirty-six years. His reign was one of the most momentous in mediæval history, its chief incident being his assumption of the imperial crown, whereby he rendered impossible the growth of a compact German monarchy. All the great offices of the state were held by Otho's kinsmen and friends; and he exercised more direct control over his subjects than any sovereign, except Charlemagne, had done before him. In wars with the Bohemians, the Wends, and the Danes, Otho was not less successful. In 951 he crossed the Alps to help Queen Adelaide, and on his return to Germany his son Ludolf rebelled against him, and was aided by Duke Conrad, by Archbishop Frederick of Mainz, and by many discontented magnates. In the midst of the struggle Germany was attacked by the Magyars, whom Duke Conrad had summoned to his aid. This common danger led to the establishment of internal peace, and Otho succeeded in defeating the Magyars. When, in 955, they returned in greater numbers than ever, he inflicted on

them so decisive a defeat that they did not again invade Germany. In Germany his policy was directed chiefly to the strengthening of the church, which was to act as a counterpoise to the influence of the secular nobles. He died on May 7, 973.

OTHO II., Holy Roman emperor, son of Otho I. and Adelaide, was born in 955. In the lifetime of his father he was twice crowned, in 961 as king of Germany, and in 967 (at Rome) as emperor. He became sole ruler after the death of Otho I. in 973. His reign was constantly beset with wars by the Danes, French, and Saracens, and he was finally defeated by the latter, July 13, 982, barely escaping being made prisoner. He died December 7, 983, leaving the empire in a state of confusion, the Danes and the Wends having risen against German supremacy. Although warlike and impetuous, Otho II. was a man of refined and scholarly tastes, which had been carefully cultivated by his mother.

OTHO III., Holy Roman emperor, son of Otho II. and Theophano, was born in 980, and crowned king of Germany at Aix-la-Chapelle in 983. In 996, when Otho was declared to have reached his majority, he went to Rome, where Crescentius had made himself supreme. After the death of Pope John XV. Otho caused Bruno to be elected to the holy see; and by him (Gregory V.) Otho was crowned emperor on May 21, 996. On the death of Gregory V., Otho's tutor, Gerbert, archbishop of Ravenna, was appointed pope; and, in part through his influence, the emperor began to form great plans, deciding to make Rome the center of the secular as well as of the spiritual world. At the approach of the year 1000, when it was commonly supposed that the earth was about to be destroyed, Otho returned to Germany, and in 1001 went back to Italy for the purpose of carrying out his far-reaching schemes; but popular disturbances in Rome compelled him to quit the city; and on the way to Ravenna he died at Paterno, near Viterbo, on January 21, 1002.

OTHO IV., Holy Roman emperor, the second son of Henry the Lion, duke of Saxony and Bavaria, of the house of Guelph, was born about 1174, educated at the court of Richard I., distinguished himself in the war between England and France, and in 1196 Richard I. made him duke of Aquitaine and count of Poitou. In 1197, a party in the Rhine country, headed by the archbishop of Cologne, set up Otho as anti-king, and he was crowned at Aix-la-Chapelle. The result was a civil war which lasted about ten years, but in 1208 Otho IV. was universally acknowledged as king. On September 27, 1209, at Rome, he was crowned emperor by the pope. After the battle of Bouvines, July 27, 1214, in which Otho, with King John of England, was defeated by the French, the discredited emperor had no chance of recovering his position. He died at the Harzburg May 19, 1218.

OTHO OF FREISING, German historian, was the son of Leopold IV., margrave of Austria, and of Agnes, the daughter of the emperor Henry IV. He became a priest, and was made provost of the monastery of Neuburg, which had been founded by his father. Soon afterward he went to Paris to prosecute his studies; and on his way back he joined the Cistercian order in the monastery of Morimont, in Burgundy, of which he became abbot. In 1137 he was elected bishop of Freising, and this position he held until his death on September 22, 1158.

He was the author of two important works, a universal history, in which he brought the record down to 1146, and a history of the reign of the emperor Frederick I.

OTIS, JAMES, was born at Barnstable, Mass., on

February 5, 1724, (O.S.) He graduated with honors at Harvard in 1743, and for a year or two afterward devoted himself to the study of literature before reading law. As the long war between Great Britain and France drew toward its close in 1762, measures were taken to enforce anew, in the British colonies in America, the commercial laws which had been in a measure lost sight of, and an order in council was sent from England in 1760 directing the issue of writs of assistance, which would authorize the customs-officers to enter any man's house on suspicion of concealment of smuggled goods. The legality of a measure which would put so dangerous a power into the hands of irresponsible men was questioned, and the superior court consented to hear argument. Otis was a law-officer under the crown, and it was his duty to appear on behalf of the government. He refused, resigned his office, and appeared for the people against the issue of the writs. His influence at home in controlling and directing the movements of events which led to the Revolution was universally felt and acknowledged; and abroad no American was so frequently quoted, denounced, or applauded in parliament and the English press, as the recognized head and chief of the rebellious spirit of the colonies. In 1765 Massachusetts sent him as one of her representatives to the first Continental Congress, where he was a conspicuous figure. Four years later his brilliant public career was brought to a close. He was killed by lightning on May 23, 1783.

OTLEY, a market-town in the West Riding of Yorkshire, England, is picturesquely situated on the south bank of the Wharfe, at the foot of the precipitous Chevin Hill, ten miles north of Bradford and nine southwest of Harrogate. The population of the town and urban sanitary district (area 2,370 acres), was 5,855 in 1871, 6,806 in 1881, and estimated at 7,500 in 1890.

OTRANTO, a city of Italy in the province of Lecce (Terra d'Otranto), fifty-three and a half miles by rail south of Brindisi, on the coast of the Adriatic, within sight on a clear day of the mountains of Albania. Though at present a small place with a communal population of only 2,333 (1889), it was formerly one of the most celebrated cities of southern Italy, and the seat of an archbishop who bore the title of primate of the Salentines.

OTTAWA, the capital of the Dominion of Canada, the seat of the supreme court, and the residence of the governor-general, of the Church-of-England bishop of Ontario, and of the Roman Catholic bishop of Ottawa, is situated in the province of Ontario, on the south bank of the Ottawa (which forms the boundary between Ontario and Quebec), about ninety miles above its junction with the St. Lawrence. By the Canadian Pacific Railway, which here crosses from the north to the south side of the Ottawa valley, the city is 120 miles west of Montreal (by the Canada Atlantic Railway the distance is 116 miles), and from Prescott on the Grand Trunk Railway and opposite Ogdensburg in New York it is distant 54 miles. The site of Ottawa is sufficiently remarkable, extending as it does for about two miles along the Ottawa from the Chaudière Falls (where the river, narrowed to 200 feet, rushes down about forty feet over a broken ledge of rock) to the falls at the mouth of the Rideau (a right-hand tributary), and rising about midway into a cluster of hills—Parliament or Barrack Hill (160 feet), Major's Hill, etc.—which front the river with bold bluffs. The Rideau Canal, which skirts the east side of Parliament Hill, separates what is known as the higher from the lower town. To the south of Parliament Hill is the more commercial part of the city, stretching westward to the suburb of Rochesterville and the lumber district around

the Chaudière Falls. Major's Hill, east of the canal, is laid out as a public park; and Sandy Hill, to the south of the lower town, forms a residential quarter. Beyond the Rideau river lies the suburban village of New Edinburgh, with the official residence of the governor-general, Rideau Hall. The city of Hull, too, on the opposite side of the Ottawa, in the province of Quebec, may be regarded as a suburb of the capital, with which it is connected by a suspension bridge. The government buildings, which give the name to Parliament Hill, rank among the finest specimens of architecture in North America. The central pile, or Parliament House, is in Italian Gothic of the thirteenth century—the material mainly Potsdam sandstone from Nepean. The main (south) front is 470 feet long and 40 feet high, and in the middle over the principal entrance stands Victoria Tower, 180 feet high, and surmounted by a great iron crown. In the center of the north front is a semi-detached polygonal (almost circular) hall, ninety feet in diameter, appropriated to the library. The cornerstone of the building was laid by the Prince of Wales in 1860. The total cost was about \$5,000,000. (For ground plan and elevation see *The Builder*, 1859 and 1860.) Two extensive blocks of departmental buildings are placed like detached wings forming the sides of the quadrangle in front. Ottawa also contains a Roman Catholic cathedral (Notre Dame) with twin spires 200 feet high, the Gray Nunnery (the mother-house of the province of Ontario), the Black Nunnery, two convents, a Roman Catholic college (Ottawa University), a Roman Catholic hospital, a Protestant hospital, a Protestant ladies' college, a city-hall, a custom-house, the government normal school for central Canada, the museum of the geological survey, etc. Besides being a great seat of the lumber trade, with sawmills and matchworks, it manufactures flour, cast-iron wares, leather, and bricks. The exports were valued at \$1,683,148 in the fiscal year ending June, 1874, and at \$2,444,723 in the fiscal year 1883—the imports at the same dates amounting to \$1,495,169 and \$1,562,344. The revenue arising from customs duties amounts to about \$1,300,000 annually. The population of the city (about half being Roman Catholics and half Protestants) was 14,669 in 1861, 21,545 in 1871, 27,412 in 1881, and 42,020 in 1889.

OTTAWA, a city of the United States, and capital of La Salle county, Ill., is located on the Illinois river near its junction with Fox river, which latter, having a fall of twenty-nine feet, furnishes abundant water-power. It is eighty-three miles southwest of Chicago and ninety-eight miles east of Rock Island, with both of which cities it communicates by the Chicago, Rock Island and Pacific and the Fox River branch of the Chicago, Burlington and Quincy railroads, also with the former city by the Illinois and Michigan canal. It was first settled in 1830, becoming incorporated as a village eight years later, and in 1853 as a city. It is the location of the supreme court buildings of the northern judicial district, and has, in addition, a large number of structures noticeable as specimens of architectural excellence. These embrace a county courthouse, several schoolhouses in addition to the high school building, the Reddick library, eight churches, two national banks, and other public and private edifices. Its manufacturing plants include cutlery, tile, and glass works, three flouring and two planing mills, one starch factory, one glass factory, one agricultural-implement factory, and other industries of a valuable and substantial character. The city is lighted by gas and electric lights, supports two daily and seven weekly papers which are there published, and has an abundant water supply from artesian wells and other sources. Near the south bank of the

Illinois river there are mineral springs, the waters of which, scientific analysis has demonstrated, are unsurpassed as remedial agents for certain diseases. The population in 1860 was 6,541; in 1870, 7,746; in 1880, 7,835; and 9,985 in 1890.

OTTAWA, the county seat of Franklin county, Kan., is situated on the Osage river, at the junction of several railroads and fifty-three miles southwest of Kansas City. It contains a court-house, eight churches, the Ottawa University, a high school, and other public schools, two national banks, etc. Population (U. S. census, 1890), 6,000.

OTTENSEN, a town of Prussia, in the province of Schleswig-Holstein, lies on the right bank of the Elbe, immediately below Altona, of which it practically forms a part. It contains numerous villas of Hamburg merchants, and carries on manufactures of machinery, tobacco, soap, gilt frames and cornices, glass, iron, and other articles. Ottensen, which received its municipal charter in 1871, contained 15,375 inhabitants in 1889.

OTTER, a group of animals belonging to the family *Mustelida*, of the order *Carnivora*, distinguished from their allies by their aquatic habits. The true otters constitute the genus *Lutra* of zoölogists, of which the common species of the British Isles, *L. vulgaris*, may be taken as the type. It has an elongated, low body, short limbs, short broad feet, with five toes on each, connected together by webs, and all with short, moderately strong, compressed, curved, pointed claws. Head rather small, broad, and flat; muzzle very broad; whiskers thick and strong; eyes small and black; ears short and rounded. Tail a little more than half the length of the body and head together, very broad and strong at base and gradually tapering to the end, somewhat flattened horizontally. The fur is of very fine quality.

The Sea-Otter (*Enhydra lutris*) differs from all other known *Carnivora* in having but two incisors on each side of the lower jaw, the one corresponding to the first (very small in the true otters) being constantly absent.

Sea-otters are only found upon the rocky shores of certain parts of the North Pacific Ocean, especially the Aleutian Islands and Alaska, extending as far south on the American coast as Oregon.

OTTOMAN EMPIRE. See TURKEY.

OTTUMWA, a city of the United States, capital of Wapello county, Iowa, lies on the Des Moines river (here spanned by a bridge), seventy-five miles northwest of Burlington by the main line of the Chicago, Burlington and Quincy Railroad, being also on the Kansas City branch of the Chicago, Milwaukee and St. Paul Railroad. It is the terminus of the Central Iowa and Wabash roads, also of the Ottumwa and Kirkville, and an important point on the Des Moines branch of the Chicago, Rock Island and Pacific. It is in short an important railway center, at which the volume of business is steadily increasing, and to accommodate which a union passenger depot has been recently erected at a cost of \$125,000. It also possesses an excellent water-power, provided in 1876 after an expensive outlay, and, with other advantages of cheap coal, superior building stone and adequate transportation facilities, offers superior inducements to manufacturers, which have latterly been generally availed of. Among the productive industries located at Ottumwa are starch and linseed-oil mills, two iron and brass foundries, two machine-shops, two boiler-works, two furniture factories, two cooper-shops, two flouringmills, planing-mills, a ruffler factory, screen factories, mining-drill and bridge-works, etc. The city also contains a large packing-house, killing 150,000 hogs annually. There are fifteen

churches, four schoolhouses, a normal school, Catholic academy, two opera-houses, three banks, six hotels and two daily and six weekly papers. It is provided with water-works, gas and electric lights, complete street railway and sewage systems, and in 1860 contained a population of 1,632, in 1870 of 5,214, in 1880 of 9,004, and 14,001 in 1890.

OTWAY, THOMAS, the best English tragic poet of the classical school, was the son of the Rev. Humphrey Otway, rector of Woolbeding, near Midhurst, in Sussex, and was born at the adjoining village of Trotton, March 3, 1651. He went to school at Wickham, near Winchester, and in 1669 proceeded to Christ Church, Oxford. In 1675 his *Alcibiades*, a poor play, was performed with indifferent success at the Duke's Theater. In the following year *Don Carlos*, a vigorous rhymed tragedy, took the town fairly by storm. He followed it up with translations of Racine's *Bernice* and Molière's *Fourberies de Scapin*, and with a very dull and indecent comedy of his own, *Friendship and Fashion*. He next went as a volunteer to the wars in Flanders, an unfortunate expedition which prompted his mediocre but not uninteresting play, *The Soldier's Fortune* (1679), in which he has turned his military experience to account. Next year he produced *The Orphan*, founded upon a novel called *English Adventures*, one of the two plays which have placed him in the front rank of English tragic poets; and *Caius Marius*, a wholesale but acknowledged plagiarism from *Romeo and Juliet*. In 1682 appeared his masterpiece, *Venice Preserved*, the plot of which is taken from Saint Réal's *Histoire de la Conjuration du Marquis de Bedemar*. Its success was decisive, but it brought little pecuniary advantage to the author, who was already sinking into abject poverty. Desponding and broken-hearted, he seems to have given himself up to dissipation, and produced but one more insignificant play, *The Atheist*, a second part of the *Soldier's Fortune* (1684). On April 14, 1685, he died on Tower Hill, under most melancholy circumstances if the tradition can be believed that he was choked by a piece of bread begged from a passer-by.

OUDENARDE, or OUDENAERDE, a small town of Belgium, in the province of East Flanders, on the Scheldt, seventeen miles south-southwest from Ghent, with a population, in 1889, estimated at 6,000. Close to its walls was fought, on July 11, 1708, the battle of Oudenarde, in which the French were defeated by the allied army under the command of Marlborough and Prince Eugene. It was retaken by the French in 1745.

OUDH, a province of British India, now under the political administration of the lieutenant-governorship of the Northwestern Provinces, but in respect of its land and courts still a distinct chief-commissionership. It is bounded on the northeast by Nepál, on the northwest by the Rohilkhand division, on the southwest by the Ganges river, on the east and southeast by the Benares division. The administrative headquarters of the province are at Lucknow.

Oudh forms the central portion of the great Gangetic plain, sloping downward from the Nepál Himálayas in the northeast to the Ganges on the southwest. For sixty miles along the northern border of Gonda and Bahráich districts the boundary extends close up to the lower slopes of the Himálayas. To the westward of this, the northern boundary recedes a little from the mountain tract, and the *tarái* in this portion of the range has been for the most part ceded to Nepál. With the exception of a belt of government forest along the northern frontier, the rest of the province consists of a fertile and densely peopled monotonous plain. Four great rivers traverse or skirt the plain of Oudh in con-

verging courses—the Ganges, the Gumti, the Gogra, and the Ráptí. The soil of Oudh consists of a rich alluvial deposit, the detritus of the Himálayan system, washed down into the Ganges valley by ages of fluvial action. Usually a light loam, it passes here and there into pure clay, or degenerates occasionally into barren sand. Oudh possesses no valuable minerals.

The general aspect of the province is that of a rich expanse of waving and very varied crops, interspersed by numerous ponds or lakes. Tamarinds overhang the huts of the poorer classes, while graceful clumps of bamboo, plantains, guavas, jack-fruit, limes and oranges add further beauty to the village plots. The flora of the government reserved forests is rich and varied. The fauna comprises most of the animals and birds common to the Gangetic plain; but many species, formerly common, have now almost, if not entirely, disappeared. The wild elephant is now practically unknown. Tigers are now only found in any numbers in the wilds of Khairigarh. Leopards still haunt the canebrakes and thickets along the banks of the rivers; and *nilgái* and antelope abound. Game birds consist of teal and wild duck, snipe, jungle fowl, and peacock. The climate of Oudh is less damp than that of Lower Bengal, and has greater varieties of temperature. The census of 1881 returned the population at 11,387,741 (5,851,655 males and 5,536,086 females), distributed over an area of 24,245 square miles. Divided according to religion, the population consisted of 9,942,411 Hindus, 1,433,443 Mohammedans, 1,154 Sikhs, 9,060 Christians, and 1,673 others. The Mohammedans still furnish the ablest public servants in the province, and supply almost entirely the native bar. The lower orders make industrious cultivators and weavers. Among the Hindu population, the Bráhmans preponderate, numbering 1,364,783, about one-eighth of the entire population. The Kshatriyas, or Rájputs, form the great landholding class, but the majority are now in decayed circumstances. The Mohammedans, Bráhmans, and Kshatriyas compose the higher social stratum of society, and number altogether about a fourth of the population. Among the lower Hindus, the Káyasths, or clerk or scrivener class, number 147,432. The Súdras, or lowest class of the Hindus, include 1,185,512 Ahírs, cattle graziers and cultivators. The best tenantry and most industrious cultivators are to be found among the Kurmís, who number nearly 800,000. Of the aboriginal or semi-Hinduized tribes, some, such as the Pásis, who number 718,906, make good soldiers, and furnish the greater part of the rural police. Fifteen towns in the province have a population exceeding 10,000 persons, according to the census of 1881, namely: Lucknow, 239,773; Faizábád, 38,828; Lucknow Cantonment, 21,530; Bahráich, 19,439; Sháhábád, 18,510; Tánda, 16,594; Sandila, 14,865; Khairábád, 14,217; Nawabganj, 13,933; Ajudhia, 11,643; Rudauli, 11,394; Bálgrám, 11,067; Mallawán, 10,970; Lahárpur, 10,437; Hardoi, 10,026. Thirty-six other towns have a population exceeding 5,000.

There are three harvests, reaped respectively in September, December, and March, while sugar-cane comes to maturity in February, cotton in May, and *sárwán* in almost any month of the year. The principal September crops are rice, Indian corn, and millets. The total assessed area in 1881–82 was 14,877,020 acres, the total assessment as land revenue being \$7,000,000, or an average of 48 cents per acre. The total cultivated area is 8,274,560 acres; cultivable and grazing lands are set down at 4,035,351 acres; and uncultivable waste at 2,567,109 acres.

Under native rule the only exports were salt and saltpeter, while the imports were confined to articles of luxury required for the Lucknow court. Since the in-

troduction of British authority, although Lucknow has declined, countless small centers of traffic have sprung up throughout the country. The staple exports consist of wheat and other food grains, and oil-seeds; the main imports are cotton piece goods, cotton twist, and salt. Cawnpur, though lying on the southern bank of the Ganges within the Northwestern Provinces, is, in fact, the emporium for the whole trade of Oudh, by rail, road, and river. The enormous exports of wheat and oil-seeds from Cawnpur represent to a great extent the surplus harvest of the Oudh cultivator. A brisk trade is also carried on with Nepál, along the three districts of Kheri, Bahráich, and Gonda.

No province of India is more destitute of wholesale manufactures than Oudh. Almost all manufactured articles of any nicety require to be imported. The only specialties are gold and silver lacework, silver chasing, and rich embroidery, all confined to Lucknow, and the weaving of a peculiar class of cotton goods, which still flourishes at Tánda.

The Oudh and Rohilkhand railway forms the great trunk of communications. A branch runs from Lucknow through Unao to Cawnpur; and another diverges at Bára Bánki for Bahramghát, on the Gogra. The whole railway forms a loop-line between the East Indian and the Sind, Punjab, and Delhi systems. Good roads connect all the principal towns, and much traffic passes along the rivers.

The administration belongs to the non-regulation system, under which a single officer discharges both fiscal and judicial functions. The province contains twelve districts, each under a deputy commissioner. The chief commissionership is now amalgamated with the governorship of the Northwestern Provinces. The high court, presided over by the judicial commissioner, forms the ultimate court of appeal. The principal items of revenue consist of the land revenue, which stands at about \$7,000,000; stamps, \$556,402; excise, \$487,997; forests, \$141,214; and cesses over \$500,000. In 1881 the total police force numbered 7,634 officers and men, maintained at a cost of \$465,660.

UDINOT, CHARLES NICOLAS, duke of Reggio, one of the most distinguished of Napoleon's marshals, was born at Bar-le-duc on April 25, 1767. From his youth he had a passion for a military career, and served in the regiment of Médoc from 1784 to 1787, when he retired with the rank of sergent. The Revolution changed his fortunes, and in 1792 his gallant defense of the little fort of Bitche in the Vosges in 1792 drew attention to him; he was transferred to the regular army in November, 1793, and after serving in all the numerous actions on the Belgian frontier he was promoted general of brigade in June, 1794, for his conduct at the battle of Kaiserslautern. He continued to serve with the greatest distinction, and on the declaration of the empire he was given the Grand Cross of the Legion of Honor, but was not included in the first creation of marshals. In the same year he received the command of ten battalions of the army of the reserve, with which he won the battle of Ostrolenka and decided the fate of at least three great battles—Austerlitz, Friedland, and Wagram. A week after the last-named battle he was promoted to the rank of marshal, and made Duc de Reggio in the following month. He was present at Lützen and Bautzen, and when holding the independent command of the corps directed to take Berlin was defeated at Gross Beeren. He was then superseded by Ney, but the mischief was too great to be repaired, and Napoleon was utterly defeated at Leipsic. On the abdication of Napoleon he rallied to the new government, and was made a peer by Louis XVIII. He died on September 13, 1847.

Oudinot's son, Charles Nicolas Victor, second duke of Reggio, who was born in 1791 and died in 1863, is chiefly known by his capture of Rome from Garibaldi in 1849.

OUGHTRED, WILLIAM, an eminent mathematician, was born at Eton in 1574, and educated there and at King's College, Cambridge, of which he became fellow. He died about 1660.

OUNCE (*felis uncia*, Buffon), a medium-sized cat of the Old World, smaller than the leopard, inhabiting the mountainous regions of Asia. Cuvier and others regard it as a variety of the panther, the last also being considered the same as the leopard.

OURO PRETO, a city of Brazil, the chief town of the extensive province of Minas Geraes, lies 170 miles north by west of Rio de Janeiro, in the upper part of the Rio São Francisco basin, at a height of 3,757 feet above the sea. The streets run up and down hill in such a way as to make riding on horseback hazardous and the use of carriages impossible. The stream which passes through the town and was formerly the scene of the most extensive gold-washing operations, the Ribeirão de Ouro Preto or Do Carmo, is a tributary of the São Francisco. Besides the churches, the prominent buildings are the president's palace, the town-house, and the prison, all fronting the principal square, the treasury, the theater (the oldest in Brazil, and restored in 1861-62), and the hospital. A public library has been in existence since before 1865. At present the importance of Ouro Preto is almost entirely administrative; formerly it was one of the great mining centers of Brazil. Its population is about 8,000.

OUSEL, or OUZEL, Anglo-Saxon *Osle*, equivalent of the German *Amsel*, apparently the ancient name for what is now more commonly known as the blackbird, the *Turdus merula* of ornithologists. In many parts of Britain the blackbird is still called the merle, a name had directly from the French, and abbreviated from the Latin *Merula*, which has the same meaning. The adult male of this beautiful and well-known species is of a deep black hue with orange-colored bill, but the female is of a uniform umber-brown above, has the chin, throat, and upper part of the breast orange-brown, with a few dark streaks, and the rest of the plumage beneath of a hair-brown. The young of both sexes resemble the mother. The blackbird is found in every country of Europe, even breeding—though rarely—beyond the arctic circle, and in eastern Asia, as well as in Barbary and the Atlantic islands. The species is very prolific, having sometimes as many as four broods in the course of the spring and summer. More or less allied to and resembling the blackbird are many other species which inhabit most parts of the world, excepting the Ethiopian region, New Zealand and Australia proper, and North America. The only other species that need here be mentioned is the Ring-Ousel, *Turdus torquatus*, which differs from the blackbird in the dark color of its bill, and in possessing a conspicuous white gorget—whence its name. It has also very different habits, frequenting wild and open tracts of country, shunning woods, groves, and plantations, and preferring the shelter of rocks to that of trees. The Water-Ousel, or Water-Crow, is commonly named the "Dipper," but not, as is commonly supposed, from the bird's habit of entering the water in pursuit of its prey, but because it may be seen perched on the top of a stone in the midst of the torrent, in a continual dipping motion, or short curtsy often repeated. The dipper haunts rocky streams, into which it boldly enters, generally by deliberately wading, and then by the strenuous combined action of its wings and feet makes its way along the bottom in quest of its living prey—freshwater mollusks

and aquatic insects in their larval or mature condition. The Water-Ousel's nest is a very curious structure—outwardly resembling a wren's, but built on a wholly different principle—an ordinary cup-shaped nest of grass lined with dead leaves, placed in some convenient niche, but encased with moss so as to form a large mass that covers it completely except only a small hole for the bird's passage. The eggs laid within are from four to six in number, and are of a pure white. These remarks refer to the Water-Ousel of central and western Europe, including the British Islands; but except as regards plumage, it is believed that they will apply to all the other species, about a dozen in number, which have been described. These inhabit suitable places throughout the whole Palæarctic region as well as the southern slopes of the Himalaya and the hill-country of Formosa, besides the Rocky Mountains and a great part of the Andes.

OUSELEY, SIR WILLIAM, Orientalist, was born in Monmouthshire in 1769, and died at Boulogne in September, 1842.

OUTLAW, in English law, is a person put out of the protection of the law by process of outlawry. A woman is properly said to be waived rather than outlawed. Outlawry was usually the result of non-appearance of the defendant or accused at the trial, and involved deprivation of all civil rights. It was finally abolished in civil proceedings in 1879. In criminal proceedings it has become practically obsolete.

OUTRAM, SIR JAMES, English general, the son of Benjamin Outram of Butterley Hall, Derbyshire, civil engineer, was born January 29, 1803. From Udney school the boy went, in 1818, to Marischal College, Aberdeen; and in 1819 an Indian cadetship was given him. Soon after his arrival in India his remarkable energy attracted notice, and in 1825 he was sent to Khandesh, where he succeeded in training a light infantry corps, formed of the wild robber Bhils, gaining over them a marvelous personal influence, and employing them with great success in checking outrages and plunder. After conducting various raids against Afghan tribes, serving as chief commissioner of Oudh, conquering the Persians at Khushab, for which he was rewarded with the Grand Cross of the Bath, he was summoned to India. Upon arriving there, he joined the army of Havelock, and led the charge for the relief of Lucknow, and held the town until the arrival of Sir Colin Campbell.

In February, 1858, he received the special thanks of both Houses of Parliament, and in the same year the dignity of baronet with an annuity of \$5,000. He died March 11, 1863, and was buried in Westminster Abbey.

OVAR, a town of Portugal, in the district of Aveiro (Beira), with a station on the railway twenty miles south of Oporto, lies at the northern end of the Aveiro lagoon—an extremely unhealthy position. It contains 10,022 inhabitants, and carries on a brisk trade with the colonies and northern Africa.

OVATION, an honor awarded in Rome to victorious generals. It was less distinguished than the triumph (see TRIUMPH), and was awarded either when the campaign, though victorious, had not been important enough for the highest honor, or when the general was not of rank sufficient to give him the right to a triumph.

OVEN, a close chamber or compartment in which a considerable degree of heat may be generated either from internal or from external sources. In English the term is generally restricted to a chamber for baking bread and other food substances, being equivalent to the French *four* or the German *Bachofen*; but the chambers in which coal is coked are termed coke-ovens. (See BAKING and COKE.)

OVERBECK, JOHANN FRIEDRICH, the reviver and leader of "Christian art" in the nineteenth century, was born in Lübeck July 4, 1789.

Overbeck, in 1810, entered Rome, which became for fifty-nine years the center of his unremitting labor. He was joined by Cornelius, Wilhelm Schadow, and Philip Veit, who took up their abode in the old Franciscan convent of San Isidoro on the Pincian Hill, and built up a severe revival on simple nature and on the serious art of Perugino, Pinturicchio, Francia, and the young Raphael. Fifty years of the artist's laborious life were given to oil and easel paintings, his works being marked by religious fervor, careful and protracted study, with a dry, severe handling, and an abstemious color. He died in Rome in 1869, aged eighty, and lies buried in San Bernardo, the church wherein he worshipped.

OVER DARWEN, a municipal borough of Lancashire, is situated in the vale of the Darwen river, shut in by heath-covered hills, and on the Lancashire and Yorkshire Railway, three miles south from Blackburn and nine north from Bolton. The town possesses cotton factories, iron and brass foundries, machine-works, paper-mills, paper-staining works—the first and probably the largest of their kind. In the neighborhood there are collieries and stone quarries. The population of the municipal borough (area 5,918 acres), in 1881, was 29,744.

OVERTURE. See MUSIC.

OVERYSSEL, or OVERIJSEL, a province of Holland, bounded northwest by the Zuyder Zee, north by Friesland and Drenthe, northeast by Hanover (Prussia), southeast by Westphalia (Prussia), and south and southwest by Gelderland, with an area of 1,291 square miles. The southern district belongs to the basin of the Yssel; the northern is watered by the Vecht and various small streams falling into the Zwartewater, the river which was for so many generations the object of dispute between Zwolle and Hasselt. A large proportion of the surface is a sandy flat relieved by hillocks, rising at times to a height of 230 feet above the sea. Husbandry, stock-raising, and dairy-farming are the principal means of subsistence in the province, though the fisheries, turf-cutting, the shipping trade, and a number of manufacturing industries are also of importance. In the district of Twenthe (toward the east) more especially there are a great many cotton-mills and bleaching-works; brick and tile making is prosecuted in the neighborhood of the Yssel; and along the coast a good many people are engaged in making mats and besoms. During the present century the province has been opened up by the construction of several large canals—the Dedemsvaart, the Noord-Willemsvaart (between the Yssel and the Zwartewater), the "Overyssel canals" (running near the eastern frontier), etc., and a fairly complete railway system has come into existence. The province is divided into the three administrative districts of Zwolle, Deventer, and Almelo. Its population, 234,376 in 1859 and 263,008 in 1875 (134,201 males, 128,807 females), was 247,136 in 1879, and estimated at 250,000 in 1889.

OVID (P. OVIDIUS NASO) was the last in order of time of the poets of the Augustan age, whose works have given to it the distinction of ranking among the great eras in the history of human culture. The year of his birth, 43 B.C., may be regarded as the last year of the republic. It was the year of the death of Cicero, which marks the close of the republican literature. Thus the only form of political life known to Ovid was that of the ascendancy and absolute rule of Augustus and his successor. Ovid belonged by birth to the same social class as Tibullus and Propertius, that of old hereditary

landowners; but he was more fortunate than they in the immunity which his native district enjoyed from the confiscations made by the triumvirs. His native town and district, Sulmo, lay high among the Apennines. To his early life in such a district he may have owed his eye for natural beauty, and the interest in the common sights of the country which relieves the monotony of his life of pleasure in Rome and the dreary record of his life spent within the walls of Tomi, and enables him to add the charm of natural scenery to the romantic creations of his fancy. While he mentions both his parents with piety characteristic of the old Italian, he tells us little more about them than that "their thrift curtailed his youthful expenses," and that his father did what he could to dissuade him from poetry, and to force him into the more profitable career of the law courts. Like Pope, "he lisped in numbers," and he wrote and destroyed many verses before he published anything. The earliest edition of the *Amores*, which first appeared in five books, and the *Heroides* were given by him to the world at an early age. He courted the society of the older and younger poets of his time, and formed one among those friendly coteries who read or recited their works to one another before they gave them to the world.

When settled at Rome, although a public career, leading to senatorial position, was open to him, and, although he filled various judicial offices, and claims to have filled them well, he had no ambition for such distinction, and looked upon pleasure and poetry as the occupations of his life. He tells us that he was married, when little more than a boy, to a wife for whom he did not care, who, he implies, was not worthy of him, and from whom he was soon separated, and afterward to a second wife, with whom his union, although through no fault of hers, did not last long. But he had other objects of his volatile affections, and one of them, Corinna, he makes the heroine of his love elegies. In his complete emancipation from all sense of restraint or wish for better things, Ovid goes beyond all his predecessors. In this Ovid reflects the tastes and tone of fashionable, well-born, and wealthy Roman society between the years 20 B.C. and the beginning of our era. He was the favorite poet of the fashionable world; he lived on terms of intimacy with its leading members, the younger representatives of the old nobility, who had survived the proscriptions and the fatal day of Philippi. His poetical accomplishment would naturally recommend him to Iulus Antonius, of whose gifts Horace has spoken so eulogistically. His marriage with his third wife, a lady of the great Fabian house, and a friend of the empress Livia, had probably taken place before this time. It thus seems likely that he may have been admitted into the intimacy of the younger society of the Palatine, although in the midst of his most fulsome flattery he does not claim ever to have enjoyed the favor of Augustus.

The actual offense which gave occasion for his banishment is not exactly known. In his frequent references to it he wavers between assertions of his innocence of anything beyond simplicity and error and the admission that, though he had done nothing, he yet deserved his punishment.

A delay of nearly two years seems to have taken place between the disgrace and the sentence passed on Ovid, and it must have been during this interval that he visited his friend Fabius at Elba, probably with the view of inducing him to intercede for him. At last the edict, dictated by relentless policy rather than personal vindictiveness, was published. He was left in the enjoyment of the rights of citizenship and in the possession of his property, but was ordered to leave Rome

on a particular day, and to settle at the very outskirts of civilization—in the semi-Greek semi-barbaric town of Tomi, near the mouth of the Danube. For eight years he bore up in his solitude, in the dreariest circumstances, suffering from the unhealthiness of the climate and exposed to constant alarm from the incursions of the neighboring barbarians. He continued to be buoyed up by hopes first of a remission of his sentence, afterward of at least a change to another place of exile. He wrote his complaints first in a series of books sent successively to Rome, afterward in a number of poetical epistles, also collected into books, addressed to all his friends who were likely to have influence at court. M. Gaston Boissier says that he left his genius behind him at Rome; and it is true that the works written in exile have not the brilliant versatility, the buoyant spirit, or the finished art of his earlier writings. They harp eternally on the same theme. All his faults of diffuseness and self-repetition appear in an exaggerated form. But there is the same power of vivid realization and expression, the same power of making his thought, feeling, and situation immediately present to the reader. He was evidently a man of gentle and genial manners; and, as his active mind induced him to learn the language of the new people among whom he was thrown, his active interest in life enabled him to gain their regard and various marks of honor. One of the last acts of his literary career was to revise the *Fasti* and re-edit it, with a dedication to Germanicus. The poet died, at the age of sixty-one, in the year 17 A.D., the third year of the reign of Tiberius.

OVIEDO, a city in the north of Spain, capital of a province of the same name, stands on a gentle northern slope, about seventy-two miles by rail and diligence to the north of Leon, and fourteen miles to the south of the Bay of Biscay. About a mile to the northwest is the Sierra de Naranco, a Red Sandstone hill 1,070 feet above the sea and about 470 above the town, which is thus sheltered from the north wind, but subject in consequence to a large rainfall. Most of the town was burnt in 1521, and the reconstruction, till recently, has been irregular. The modern town has the usual equipments in the way of hospitals, schools, theater, casino, and the like; and in the neighborhood are some pleasant paseos or promenades (San Francisco, Bombé, Jardin Botanico). The industries of the town include hatmaking and tanning, and there is also a manufactory of arms. The population of the ayuntamiento in 1877 was 34,460; in 1889, estimated in round numbers at 50,000.

OVIEDO Y VALDEZ, GONZALO FERNANDEZ DE, an early historian of Spanish America, was born in Madrid, of noble Asturian descent, in 1478, and died at Valladolid in 1557.

OWEGO, a post-village and township of the United States, capital of Tioga county, N. Y., lies at the mouth of Owego Creek, on the north side of the Susquehanna (here crossed by a bridge), 237 miles northwest of New York by the New York, Erie and Western Railroad, which here connects with the Delaware, Lackawanna and Western and the Southern Central Railroads. The village, built at the foot of a considerable hill in the heart of a fine agricultural district, is a pleasant place with broad maple-shaded sidewalks along its principal streets. The village is thirty-seven miles east of Elmira, twenty-two miles west of Binghamton, and thirty-three miles southwest of Ithaca. It contains a handsome courthouse, the free academy of Owego, and graded schools, eight churches, two national banks, etc., and three weekly newspapers. Gristmills, soapworks, marble-works, a piano factory, and carriage-works are among the industrial establish-

ments. The population of the village was 4,756 in 1870, 5,525 in 1880, and 5,147 in 1889; that of the whole township 9,442 in 1870, and 9,984 in 1880.

OWEN, JOHN (*Ovenus* or *Audoenus*), a writer of Latin epigrams, once very popular all over Europe, was of Welsh extraction, and was born at Armon, Caernarvonshire, in 1560, and died in 1622.

OWEN, JOHN, theologian, was born of Puritan parents at Stadham, in Oxfordshire, in 1616. At twelve years of age he was admitted at Queen's College, Oxford, where he took his B.A. degree in 1632 and M.A. in 1635. Although he was formally united to Presbyterianism, Owen's views were originally inclined to those of the Independents, and, as he acquainted himself more fully with the controversy, he became more resolved in that direction, and about 1646 declared his change by founding a church on Congregational principles, and, in 1647, by publishing *Eshcol*, as well as various works against Arminianism. He became acquainted with Cromwell, who carried him off to Ireland, in 1649, as his chaplain. While there he began the first of his frequent controversies with Baxter by writing against the latter's *Aphorisms of Justification*. In October, 1653, he was one of the several ministers whom Cromwell, probably to sound their views, summoned to a consultation as to church union, and in December of the same year had the honor of D.D. conferred upon him by his university. During the years 1654-58 his chief controversial works were *Divina Justitia*, *The Perseverance of Saints* (against Goodwin), and *Vindiciæ Evangelicæ* (against the Socinians). In March, 1660, the Presbyterian party being uppermost, Owen retired to Stadham, where he wrote the laborious *Theologiaumena Pantodapa*, a history of the rise and progress of theology. In 1661 was published the celebrated *Fiat Lux*, a work in which the beauty of Roman Catholicism is contrasted with the confusion and multiplicity of Protestant sects. At Clarendon's request Owen answered this in 1662 in his *Animadversions*; and this led of course to a prolonged controversy.

In 1663 he was invited by the Congregational churches in Boston, New England, to become their minister, but declined. The Conventicle and Five Mile Acts soon drove him to London; and in 1667 he published his *Catechism*, which led to a proposal from Baxter for union. It was now, too, that he published the first part of his vast work upon the Epistle to the Hebrews.

In 1669 Owen wrote a spirited remonstrance to the Congregationalists in New England, who, under the influence of Presbyterianism, had shown themselves persecutors. In 1670 Parker attacked the Nonconformists. Owen answered him, and in 1670 Harvard university invited him to become their president; he received similar invitations from some of the Dutch universities.

In 1674 Owen was attacked by one Doctor Sherlock, whom he easily vanquished, and from this time until 1680 he was engaged upon his ministry and the writing of religious works. From this time to his death he was occupied with continual writing, disturbed only by an absurd charge of being concerned in the Rye House Plot. His most important work was his *Treatise on Evangelical Churches*, in which were contained his latest views regarding church government. He died quietly at Ealing, on August 24, 1683, and was buried on September 4th in Bunhill Fields, being followed to the grave by a large procession of persons of distinction.

OWEN, ROBERT, philanthropist, and founder of English socialism, was born at the village of Newtown, Montgomeryshire, in North Wales, in 1771. At ten he went to Stamford, where he served in a draper's shop

for three or four years, and, after a short experience of work in a London shop, removed to Manchester. In this factory Owen used the first bags of American sea-island cotton ever imported into the country; it was the first cotton obtained from the Southern States. He also made remarkable improvement in the quality of the cotton spun; and there is no reason to doubt that he was the first cotton-spinner in England. Owen had become manager and one of the partners of the Chorlton Twist Company at Manchester, when he made his first acquaintance with the scene of his future philanthropic efforts at New Lanark. His principles—of the irresponsibility of man and of the effect of early influences—are the keynote of Owen's whole system of education and social amelioration, and are embodied in his first work, *A New View of Society, or Essays on the Principle of the Formation of the Human Character*, the first of these essays (there are four in all) being published in 1813. For the next few years Owen's work at New Lanark continued to have a national and even a European significance. His schemes for the education of his workpeople attained to something like completion on the opening of the institution at New Lanark in 1816. According to the unanimous testimony of all who visited it, the results achieved by Owen were singularly good. His first departure in socialism took place in 1817, and was embodied in a report communicated to the Committee of the House of Commons on the Poor Law. The general misery and stagnation of trade consequent on the termination of the great war was engrossing the attention of the country. Owen pointed out that the permanent cause of distress was to be found in the competition of human labor with machinery, and that the only effective remedy was the united action of men, and the subordination of machinery. His proposals for the treatment of pauperism were based on these principles. He recommended that communities of about 1,200 persons each should be settled on quantities of land of from 1,000 to 1,500 acres, all living in one large building in the form of a square, with public kitchen and messrooms. Each family should have its own private apartments, and the entire care of the children till the age of three, after which they should be brought up by the community, their parents having access to them at meals and all other proper times. These communities might be established by individuals, by parishes, by counties, or by the state; in every case there should be effective supervision by duly qualified persons. Work, and the enjoyment of its results, should be in common. And he soon proceeded to advocate such a scheme as the best form for the reorganization of society in general.

In 1825, an experiment was attempted under the direction of his disciple, Abram Combe, at Orbiston, near Glasgow; and in the same year Owen himself commenced another at New Harmony, Ind. After a trial of about two years both failed completely. On his return from America he made London the center of his activity. Most of his means having been sunk in the New Harmony experiment, he was no longer a flourishing capitalist, but the head of a vigorous propaganda, in which socialism and secularism were combined. The word "socialism" first became current in the discussions of the Association of all Classes of all Nations, formed by Owen in 1835. By 1846 the only permanent result of Owen's agitation, so zealously carried on by public meetings, pamphlets, periodicals, and occasional treatises, was the coöperative movement, and for the time even that seemed to have utterly collapsed. In his later years Owen became a firm believer in spiritualism. He died at his native town at the age of eighty-seven.

OWENSBORO, a city of the United States, capital of Daviess county, Ky., on the Ohio, 160 miles below Louisville. It engages extensively in the manufacture of whisky and the curing of tobacco, and has wagon factories, flouring-mills, and foundries. The population, 6,231 in 1880, exceeded 9,000 in 1883, and in 1889 was 9,837.

OWEN SOUND, a town and port of entry of the Province of Ontario, and capital of Grey county, is located on Georgian Bay, at the mouth of the river Sydenham, and is the terminus of the Toronto, Grey and Bruce Railway, which now forms part of the system of the Canadian Pacific Railway, 131 miles northwest of Toronto. The town is handsomely laid out and well built, and its harbor is considered one of the most available and desirable on Lake Huron. It is twelve miles long, five miles wide at its mouth, and besides offering safe anchorage is navigable for vessels of the largest capacity. The town contains a commodious town-hall, a courthouse, jail, and registry office, three newspaper offices, several churches, a collection of stores and commercial houses and a number of hotels. The lines of manufacture carried on embrace mill machinery, agricultural implements, turbine wheels, engines, sewing machines, woodenware, leather, tweed, woolen cloths, etc.; also two breweries, two brickyards, five large grain warehouses and elevators, flour and saw mills, and various enterprises of a less prominent character. Many vessels engaged in the lumber and grain trade are owned at and operated from this point. The population in 1889 was 5,000.

OWL, the Anglo-Saxon *Ule*, Swedish *Uggla*, and German *Eule*—all allied to the Latin *Ulula*, and evidently of imitative origin—the general English name for every nocturnal bird of prey, of which group nearly 200 species have been recognized. The Owls form a very natural assemblage, and one about the limits of which no doubt has for a long while existed. Placed by nearly all systematists for many years as a family of the order *Accipitres* (or whatever may have been the equivalent term used by the particular taxonomers), there has been of late a disposition to regard them as forming a group of higher rank. On many accounts it is plain that they differ from the ordinary diurnal birds of prey, more than the latter do among themselves; and, though in some respects Owls have a superficial likeness to the GOATSUCKERS (*q.v.*), and a resemblance more deeply seated to the GUACHARO (*q.v.*), even the last has not been made out to have any strong affinity to them. A good deal is therefore to be said for the opinion which would regard the Owls as forming an independent order, or at any rate sub-order, *Striges*. Whatever be the position assigned to the group, its subdivision has always been a fruitful matter of discussion, owing to the great resemblance obtaining among all its members, and the existence of safe characteristics for its division has only lately been at all generally recognized.

Among Owls are found birds which vary in length from five inches—as *Glaucidium cobanense*, which is therefore much smaller than a skylark—to more than two feet, a size that is attained by many species. A considerable number of species of Owls, belonging to various genera, and natives of countries most widely separated, are remarkable for exhibiting two phases of coloration—one in which the prevalent browns have a more or less rusty-red tinge, and the other in which they incline to gray. Another characteristic of nearly all Owls is the reversible property of their outer toes, which are not infrequently turned at the bird's pleasure quite backward.

Among the multitude of Owls there is only room here to make mention of a few of the more interesting. First

must be noticed the Tawny Owl—the *Strix stridula* of Linnæus. It is the largest of the species indigenous to Britain, and is strictly a woodland bird, only occasionally choosing any other place for its nest than a hollow tree. Its food consists almost entirely of small mammals, chiefly rodents; but, though on this account most deserving of protection from all classes, it is subject to the stupid persecution of the ignorant, and is rapidly declining in numbers. Its nearest allies in North America are the *S. nebulosa*, with some kindred forms, the *S. Occidentalis* of California and Arizona.



California Owl. (*S. Occidentalis*).

Common to the most northerly forest-tracts of both continents (for, though a slight difference of coloration is observable between American examples and those from the Old World, it is impossible to consider it specific) is the much larger *S. cinerea* or *S. lapponica*, whose iron-gray plumage, delicately mottled with dark brown, and the concentric circles of its facial disks make it one of the most remarkable of the group. Then may be noticed the genus *Bubo*—containing several species which from their size are usually known as Eagle-Owls. Here the Nearctic and Palearctic forms are sufficiently distinct—the latter, *B. ignavus*, the *Duc* or *Grand Duc* of the French, ranging over the whole of Europe and Asia north of the Himalayas, while the former, *B. virginianus*, extends over the whole of North America. A contrast to the generally somber color of these birds is shown by the Snowy-Owl, *Nyctea scandiaca*, a circumpolar species, and the only one of its genus, which disdains the shelter of forests and braves the most rigorous arctic climate, though compelled to migrate southward in winter when no sustenance is left for it. Its large size and white plumage, more or less mottled with black, distinguish this from every other Owl. There may be mentioned the birds commonly known in English as “Horned” Owls—the *Hibous* of the French, belonging to the genus *Asio*. One, *A. otus* (the *Otus vulgaris* of some authors), inhabits woods, and, distinguished by its long tufts, usually borne erected, would seem to be common to both America and Europe—though experts profess their ability to distinguish between examples from

each country. Another species, *A. accipitrinus* (the *Otus brachyotus* of many authors), has much shorter tufts on its head, and they are frequently carried depressed so as to escape observation. This is the “Woodcock Owl” of English sportsmen, for, though a good many are bred in Great Britain, the majority arrive in autumn from Scandinavia, just about the time that the immigration of woodcocks occurs. This species has an enormous geographical range, including not only all Europe, North Africa, and northern Asia, but the whole of America—reaching also to the Falklands, the Galapagos, and the Sandwich Islands—for the attempt to separate specifically examples from those localities only shows that they possess more or less well-defined local races. Commonly placed near *Asio*, but whether really akin to it cannot be stated, is the genus *Scops*, of which nearly forty species, coming from different parts of the world, have been described; but this number should probably be reduced by one-half. The type of the genus, *S. giu*, the *Petit Duc* of the French, is a well-known bird in the south of Europe, about as big as a thrush, with very delicately penciled plumage, occasionally visiting Britain, emigrating in autumn across the Mediterranean, and ranging very far to the eastward. Further southward, both in Asia and Africa, it is represented by other species of very similar size, and in the eastern part of North America by *S. asio*, of which there is a tolerably distinct western form, *S. kennicotti*, besides several local races. At first the two forms were thought to be distinct, and then for some time the belief obtained that the ruddy birds were the young of the grayer form, which was called *S. nævia*; but now the “Red Owl” and the “Mottled Owl” of the older American ornithologists are known to be one species. One of the most remarkable of American Owls is *Speotyto cunicularia*, the bird that in the northern part of the continent inhabits the burrows of the prairie dog, and in the southern those of the biscacha, where the latter occurs—making holes for itself, says Darwin, where that is not the case—rattlesnakes being often also joint tenants of the same abodes. The odd association of these animals, interesting as it is, cannot here be more than noticed, for a few words must be said, ere we leave the Owls of this section, on the species which has associations of a very different kind—the bird of Pallas Athene, the emblem of the city to which science and art were so welcome. There can be no doubt, from the many representations on coins and sculptures, as to their subject being the *Carine noetua* of modern ornithologists, but those who know the grotesque actions and ludicrous expression of this veritable buffoon of birds can never cease to wonder at its having been seriously selected as the symbol of learning, and can hardly divest themselves of a suspicion that the choice must have been made in the spirit of sarcasm. This Little Owl (for that is its only name—though it is not even the smallest that appears in England), is spread throughout the greater part of Europe, but it is not a native of Britain. It has a congener in *C. brama*, a bird well known to all residents in India.

Finally, we have Owls of the second section, those allied to the Screech-Owl, *Aluco flammeus*. This, with its discordant scream, its snoring, and its hissing, is far too well known to need description, for it is one of the most widely-spread of birds, and is the Owl that has the greatest geographical range, inhabiting almost every country in the world, Sweden and Norway, America north of latitude 45°, and New Zealand being the principal exceptions. It varies, however, not inconsiderably, both in size and intensity of color, and several ornithologists have tried to found on these variations more than half a dozen distinct species.

OWOSSO, or OWASSO, a city of the United States, is delightfully located on the Shiawassee River, in Owosso township, Shiawassee County, Mich., twenty-eight miles northeast of Lansing, thirty-six miles southwest of Saginaw, and seventy-eight miles northwest of Detroit. The ground upon which the city is situated is rolling, and the scenery picturesque, affording very advantageous sites for business and residence purposes, besides presenting an attractive appearance to the eye. It was settled at an early day, and the Shiawassee river furnishing ample water-power to settlers, both of the present city and of the country surrounding, has proved a valuable aid in the development apparent. It is an important point on the Detroit and Milwaukee railroad, where it crosses the Jackson, Lansing and Saginaw road, and the location of the machine-shops of the latter. The city contains seven churches, one high school, two national banks, two newspaper offices, two flouring-mills, two foundries, one tannery, and a line of manufacturing industries devoted to furniture, sash, doors, blinds, brick, etc., etc. The population in 1880 was 2,501, and 6,544 in 1890.

OX. See CATTLE.

OXALIC ACID, an organic acid which, in a general scientific sense, excites our interest chiefly by its almost universal diffusion throughout the vegetable kingdom. Traces of oxalates are contained in the juices of, probably, all plants at certain stages of their growth; but so are lime-salts, which, in solutions, can coëxist with the former only in the presence of free acid. Hence the frequent occurrence in plant-cells of those crystals of oxalates of lime with which all microscopists are familiar. In certain algæ, if they grow on calcareous soils, this salt, according to Bracannot, may form as much as one-half of the total dry solids. Of phanerogamic tissues, the roots of the officinal kinds of rhubarb may be named as being peculiarly rich in oxalate of lime-crystals. It is perhaps as well to add that the juicy stems of the garden rhubarb, although not free of oxalic, owe their sourness chiefly to malic acid. The strongly sour juices of certain species of *Rumex* and *Acetosella*, on the other hand, are exceptionally rich in acid oxalates. The juice of *Oxalis Acetosella*, when concentrated by evaporation, deposits on cooling a large crop of crystals of binoxalate of potash. This salt, as an educt from the plant-juice named, has been known for some three centuries as "sal acetosellæ" or "salt of sorrel." Oxalic acid and all soluble oxalates are dangerous poisons, which almost implies that they cannot occur, under normal conditions, in the juices of the higher animals. Yet human urine always contains traces of oxalate of lime, which, when the urine is or becomes alkaline, forms on standing a microcrystalline deposit. In certain diseased conditions of the system the oxalate is formed more largely, and may be deposited within the bladder in crystals or even develop into calculi.

The discovery of oxalic acid must be credited to Scheele, who obtained it, in 1776, by the oxidation of sugar with nitric acid, and called it saccharic acid. In 1784 he proved its identity with the acid of *sal acetosellæ*. Our knowledge of the elementary composition of oxalic acid is the result of the independent labors of Berzelius, Döbereiner, and Dulong (1814-21).

OXENSTIERNA, AXEL, COUNT OF, Swedish statesman, was born at Fanö, in Upland, on June 16, 1583. He studied theology at Rostock, Wittenberg, and Jena; and in 1602 spent some time in visiting German courts. In 1606 he was sent as ambassador to the court of Mecklenburg, and in 1609 he became a member of the Swedish senate. When Gustavus Adolphus succeeded to the throne, in 1611, Oxenstierna was appointed

chancellor. In 1614 he went with the king to Livonia, and helped to bring about the cessation of hostilities between Sweden and Russia. After the intervention of Gustavus in the Thirty Years' War, Oxenstierna was made governor-general of all the districts in Prussia which had been overrun by the Swedes. In 1632, when Gustavus fell at the battle of Lützen, the responsibility for the maintenance of the Protestant cause fell chiefly upon Oxenstierna; and in one of the greatest crises in the history of the world he displayed splendid courage, discretion, and resource. At a congress held in Heilbronn he was appointed director of the evangelical confederation, and in this capacity he went to France and Holland to secure the aid of these countries against the emperor. He returned, in 1636, to Sweden, where he resigned his exceptional powers and resumed his place in the senate as chancellor of the kingdom. Oxenstierna had the reputation of being one of the wisest statesmen of his age, and during his absence from his country he had drawn up the scheme of a system of government which had been accepted in 1634 by the Swedish estates. He died on August 28, 1654.

OXFORD, or OXON, an inland county of England, is bounded northeast by Northamptonshire, northwest by Warwickshire, west by Gloucestershire, south-southwest and southeast by Berks, and east by Bucks. In shape it is very irregular, its breadth varying from about seven to twenty-seven and a half miles, and its greatest length being about fifty-two miles. The total area is 483,621 acres, or about 756 square miles. The character of the scenery varies greatly in different districts. Immediately to the east of the city of Oxford a range of hills stretches between the valleys of the Thames and Cherwell, the highest point being Shotover Hill, 560 feet. In the central district the surface is less varied, and along the rivers there are extensive tracts of flat land, but the finely cultivated fields and the abundance of wood lend an aspect of richness to the landscape. The northern part of the county is flat and bare, its bleakness and monotony being increased in some districts by the stone fences.

Oxfordshire abounds in streams and watercourses, the Thames, which skirts the whole southern border of the county, forming for the most part of its course the boundary with Berks. In the earlier part of its course it is called the Isis. The Windrush and Evenlode both flow southeast from Gloucestershire; the Cherwell traverses the whole length of the county south from Northamptonshire; and the Thames crosses its southeast corner from Bucks. The Thames is navigable for small craft to Gloucestershire, and for vessels of considerable burden to Oxford. The Oxford Canal, ninety-one miles long, begun in 1769 and finished in 1790, enters the northeastern extremity of the county near Claydon, and, following the course of the Cherwell, passes south to the city of Oxford.

The climate is salubrious and dry, but generally colder than the other southern districts of England, especially in the bleak and exposed regions of the Chilterns. Crops are later in the uplands than in more northerly situations at a lower elevation. Agriculture is in a fairly advanced condition, but the possibilities of improvement are not by any means exhausted, as the soil is on the whole above the average in fertility.

According to the agricultural returns of 1883, as many as 417,509 acres, or about eight-ninths of the total of the county, were under cultivation.

Blankets are manufactured at Witney, and tweeds, girths, and horsecloths at Chipping Norton. There are paper-mills at Hampton-Gay, Shiplake, Sandford-on-Thames, Woolvercot, and Eynsham. Agricultural implements and portable engines are made at Banbury.

and gloves at Woodstock, where the polished steel work has long ago ceased. A large number of women and girls are employed in several of the towns and villages in the lace manufacture.

Oxfordshire comprises fourteen hundreds, the municipal boroughs of Banbury (3,600) and Chipping Norton (4,167), the greater part of the city of Oxford, of which the remainder is in Berkshire, and a small portion of the municipal borough of Abingdon, of which the remainder is also in Berkshire. The population in 1801 was 111,977, which by 1841 had increased to 163,143, by 1851 to 170,439, by 1871 to 177,975, and by 1881 to 179,559, of whom 88,025 were males and 91,534 females.

OXFORD, the county town of Oxfordshire, a cathedral city, a municipal and parliamentary borough, and the seat of a famous university, is situated at a distance of forty-five miles west-northwest from London, in the center of the south midland district. It lies for the most part on a low ridge between the rivers Thames (locally called the Isis) and Cherwell, immediately above their junction.

First among the institutions ranks the Bodleian Library (see LIBRARIES). In the older part the manuscripts and most of the printed books are preserved; the fabric of the central part dates from the fifteenth century, when it housed the library given by Humphrey, duke of Gloucester. The present library, founded by Sir Thomas Bodley in 1602, has since 1610 had the right to receive a copy of every book published in the United Kingdom, and its growth has been accelerated by donations from Selden, Rawlinson, Malone, Gough, Douce, and others. The modern books are contained in the adjacent circular building known as the "Camera Bodleiana" or "Radcliffe," built 1737-49 by James Gibbs, with money left by Dr. Radcliffe to erect and endow a scientific library. The Divinity School, immediately below the older reading-room of the Bodleian, was finished in 1480, and is still the finest room in Oxford. The Ashmolean Museum is an unpretentious edifice, the first public museum of curiosities in the kingdom, founded by Elias Ashmole, and opened in 1683. It contains models, ethnographical collections, English and Egyptian antiquities, and miscellaneous curiosities. Another of the group of university buildings is the church of St. Mary the Virgin, in the High street, which derives peculiar interest from its long connection with academic history. Here were held the disputations preparatory to a degree; here, time out of mind, the university sermons have been preached; and the northeast corner is the ancient seat of the Houses of Convocation and Congregation. Around it were the earliest lecture-rooms, and its bell was the signal for the gathering of the students, as St. Martin's for the townsmen. It has memories, too, of Wycliffe, of Cranmèr, Latimer and Ridley, of Laud, of Newman, and of Pusey. Close to the Cherwell, is the Botanic Garden, the first of its kind in England, opened in 1683, the design having been supplied by Inigo Jones.

At a short distance to the east in the Park is the University Observatory (1873), consisting of two dome-shaped buildings connected by lecture-rooms. The Clarendon Press in Walton street is probably the best appointed of provincial establishments. Founded partly with the profits arising from the copyright of Clarendon's *History of the Rebellion*, the Press was for long established in the Clarendon Building. The south side is entirely devoted to the printing of Bibles and prayer-books. All Souls College (*Collegium Omnium Animarum*), occupies a central position. The chief points of interest are the magnificent reredos in the chapel, coëval with the college, but lost sight of since the Reformation until discovered and restored in

1872-76; the Codrington Library, chiefly of works on jurisprudence; and the turrets (1720) designed by Hawksmoor. The west front is due to Sir Christopher Wren. It was founded in 1437 by Archbishop Chichele. Balliol College, at present the largest in numbers, is also among the oldest. In 1282 the Lady Dervorgilla, widow of John de Balliol, gave effect to his wishes by issuing statutes to a body of students in Oxford who two years later settled on the present site of the college. The King's Hall and College of Brasenose (*Collegium Aenei Nasi*) is the combined work of William Smith, bishop of Lincoln, and Sir Richard Sutton. The library and chapel date from the Restoration. Christ Church (*Aedes Christi*), the greatest and most imposing college, and projected on a still larger scale as Cardinal College by its first founder, Wolsey, was established by Henry VIII., in 1525. The library on the south side of the Peckwater quadrangle was built in 1716-61. It contains valuable pictures and engravings, as well as extensive collections of books. The hall (built in 1529) is one of the sights of Oxford. It is commonly said that the three great English religious revivals sprang from Christ Church, Wycliffe having been warden of Canterbury Hall, now part of the house, John Wesley a member of the college, and Pusey a canon. Corpus Christi College was founded in 1516 by Bishop Richard Fox, who expressly provided for the study of Greek and Latin. The chief ornament of the college is the library, which is rich in illuminated and early English MSS., and in early printed books. Exeter College may be said to have been founded (as Stapeldon Hall) in 1314 by Walter de Stapeldon, bishop of Exeter; but Sir William Petre, in 1566, largely added to the original endowment. Most of the buildings date from the present century; the chapel, the proportions of which resemble those of Sainte Chapelle at Paris, was built in 1856-59, by Sir G. Gilbert Scott, the hall in 1818, the Broadstreet front in 1855-58. The secluded gardens are beautifully situated beneath the shadow of the Divinity School and Bodleian. Hertford College, founded in 1874, is on a site of old and varied history.

The Welsh College, Jesus, dates from 1571, having been founded by Dr. Hugh Price. Keble College is a testimony to the reverence for the character and principles of the Rev. John Keble, who died in 1866. Merton College is in a very definite sense the oldest; the earliest extant statutes were given in 1264 by Walter de Merton, and before 1274 it was settled in Oxford. The library, built about 1349, is the oldest existing library in England. New College, or more properly the college of St. Mary Winton, is the magnificent foundation of William of Wykeham, who closely connected it with his other great work, Winchester School. The foundation-stone was laid in 1380. Oriel College was founded by Adam de Brome in 1324, and reconstituted by Edward II. in 1326. The present buildings chiefly date from the first half of the seventeenth century. The Tractarian movement is closely connected with the college of Newman and Keble. Pembroke College (1624) derives its name from the chancellor of the university at the time when it was established by Richard Wightwick, partly by means of a legacy from Thomas Tesdale. The library contains many memorials of Doctor Johnson, who was a member of the college. Queen's College, so called from its first patroness, Queen Philippa, was founded in 1340 by Robert de Eglesfield, whose name is commemorated yearly in the custom of presenting a needle and thread ("aiguille et fil," a rebus) to each fellow on New Year's Day. Queen's possesses the largest and most valuable collegiate library of printed books, chiefly owing to the munificence of Bishop Barlow in 1691 and of Dr. Robert Mason in 1841. St.

John the Baptist's College was the work of Sir Thomas White, a London merchant, in June, 1555. The chapel and other parts of the buildings belong to the earlier foundation of St. Bernard's College. Trinity College, founded in February, 1555, by Sir Thomas Pope, was the first post-Reformation college and the first established by a layman. The library is the original one of Durham College, in which Richard de Bury's books were deposited in the fourteenth century. University College, the proper title of which is the Great Hall of the University (*Collegium Magnæ Aulæ Universitatis*), is generally accounted the oldest college, although its connection with Alfred is wholly legendary. It received the first endowment given to students at Oxford, in 1249, from William of Durham, but its first statutes date from 1280, and its tenure of the present site from about 1340. None of the present buildings are older than the seventeenth century. The detached library was built in 1860. Wadham College was founded in 1610 by Dorothy Wadham, in pursuance of the designs of her husband, Nicholas, who died in 1609. Worcester College, founded in 1283 as Gloucester Hall, was at first a place of study for Benedictines from all parts of the country, until it was dissolved at the Reformation, when the buildings passed to the see of Oxford. In 1560 the founder of St. John's College reopened it as St. John the Baptist's Hall, but after changing fortunes, and an attempt, in 1689, to form it into a college for students of the Greek Church, it came, in 1714, into the hands of the trustees of Sir Thomas Cookes, who founded the present college. The University Park, comprising eighty acres, is beautifully situated on the banks of the Cherwell.

OXFORD, ROBERT HARLEY, FIRST EARL OF, the eldest son of Sir Edward Harley, a prominent landowner in Herefordshire, was born in Bow street, Covent Garden, London, December 5, 1661. At the Revolution of 1688, Sir Edward and his son raised a troop of horse in support of the cause of William III., and took possession of the city of Worcester in his interest. The family zeal for the Revolution recommended Robert Harley to the notice of the Boscawen family, and led to his election, in April, 1689, as the parliamentary representative of Tregony, a borough under their control. He remained its member for one parliament, when he was elected by the constituency of New Radnor, and he continued to represent it until his elevation to the peerage in 1711. From the general election of February, 1701, until the dissolution of 1705, he held the office of speaker. For a part of this period, from May 18, 1704, he combined with the speakership the duties of a principal secretary of state, displacing in that office the Tory earl of Nottingham. When Lord Godolphin was sent into private life, five commissioners to the treasury were appointed (August 10, 1710), and among them figured Harley as chancellor of the exchequer, a position which he obtained through intrigue. On May 24, 1711, the minister became Baron Harley of Wigmor and earl of Oxford and Mortimer; before the month was ended he was created lord treasurer, and in the following year he became a knight of the Garter. But after a time Oxford's friends began to complain of his habitual dilatoriness in office, and to find some excuse for his apathy in ill health, aggravated by excess in the pleasures of the table and by the loss of his favorite child. By slow degrees the confidence of Queen Anne was transferred from Oxford to Bolingbroke; on July 27, 1714, the former surrendered his staff as lord treasurer, and on August 1st the queen died.

On the accession of George I. the defeated minister retired to Herefordshire, but a few months later his impeachment was decided upon and he was committed

to the Tower. After an imprisonment of nearly two years the prison doors were opened, and he was allowed to resume his place among the peers, but he took little part in public affairs, and died almost unnoticed May 21, 1724.

OXUS. This river rises in the lofty table-lands which are intercepted between the two great mountain ranges of Central Asia, the Thián Shán and the Hindú Kúsh, in the region where they approach each other most closely. It flows westward through a broad valley, receiving numerous affluents from the mountain ranges on either side; then bending to the northwest it traverses the arid deserts of western Turkestan on the borders of Bokhara, descends into and fertilizes the rich oasis of Khiva, and finally disembogues at the southern extremity of the Sea of Aral. Its course is roughly parallel to that of its sister river the Jaxartes, which rises to the north of the Thián Shán water-parting, and disembogues at the northern extremity of the Sea of Aral.

The regions in which the Oxus takes its birth, and through which it passes until it becomes lost in the Sea of Aral, may be divided into upper, middle, and lower; the upper is constituted by the highlands between the Thián Shán and the Hindú Kúsh ranges, and the middle by the plains and uplands which are situated in the broad valley between the western prolongations of the same ranges; the lower lies in the plains of western Turkestan.

Two systems of rivers give birth to the sources of the Oxus, one to the north rising in and around the Alai plateau, the other to the south rising in the Pamir plateaus, of which there are several. The two systems are divided by a great chain of mountains known locally as the Kizil-yart range, but called by Fedchenko (looking from the north) the Trans-Alai range, and by recent Russian surveyors the Peter the Great range; it lies from east to west on the southern border of the Alai plateau, and throws out spurs westward to Darwáz; its medium height above the sea level is 18,000 or 19,000 feet, with occasional peaks rising to 25,000 feet. Of the Oxianian affluents to its north and west the principal are the Wákhsh or Súrkh-áb (= the Kizil-su = the Red River), rising in the Alai, and the Múksú and Khing-áb rivers, which join the Wákhsh in the district of Karategin.

The system of southern affluents is, however, the most important of the two politically as well as geographically, comprising as it does the water-partings which define the boundaries between China, Afghanistan, and Bokhara, and all the rivers of what is generally known as the Pamir region.

The best-known river of the Pamir plateaus is the Panjah, which receives all the other rivers of this region before it enters the plains; above Kila Panjah it has two important affluents, one from the east rising in Kanjút, and probably about 120 miles long, the other from the northeast rising in the lake of the Great Pamir (Wood's Lake Victoria), and about eighty miles long. From the point of junction to Kila-Bár-Panjah is 140 miles; here the united waters of the Sochán and Shákh-dara rivers from the east are received; thirty-three miles lower down, near Kila Wámar, the Bártang river, also from the east, is received.

The Pamir plateaus are generally covered with a rich soil which affords very sweet and nourishing grasses, though at too great an altitude for husbandry; there is an unlimited extent of summer pasture lands for the Khirgiz and other nomad tribes and the herdsmen of the surrounding districts. But for the plentiful supply of food for cattle which these regions afford during several months of the year, they could never have been

crossed by the great armies and hordes which are said to have passed over them. The cultivable areas are small, and are usually restricted to narrow ledges on the margins of the rivers, which, however, when well cultivated and manured, yield rich returns; food-stuffs have to be largely obtained from the plains below; mulberry-trees thrive well and are much prized, because their unripened berries are ground to flour and form a serviceable article of food.

As regards the Oxus, some eminent geographers are of opinion that it has disembogued into the Aral Sea from time immemorial as at this day; other geographers of equal weight have asserted that the Aral has fluctuated at different periods of history between the condition of a great inland sea and that of a reedy marsh, according to the varying course of its two feeders, the Jaxartes and the Oxus. Now the position and height of the head of the delta of the Oxus relatively to the Aral and the Caspian Seas are such that comparatively slight changes in the relations of the river to its banks and bed would readily divert its course from one sea to the other. Khwāja-ili, at the head of the delta, is 217 feet above the mean sea; the Aral is 158 feet above and the Caspian 85 feet below the mean sea. The length of channel from Khwāja-ili to the Aral is 110 miles, with a fall of fifty-nine feet, or about six inches in the mile; the length of channel from the town of Urganj near Khwāja-ili to the Caspian is about 600 miles, with a fall of (say) 300 feet, or also about six inches to the mile. Thus the degree of slope is much the same in both directions, and consequently the blocking of the channel toward one sea—either naturally as by an accidental deposit of silt, or artificially by the construction of dams for the diversion of the river—would most probably be soon followed by a flow of water toward the other sea.

OXYGEN. See CHEMISTRY.

OXYHYDROGEN FLAME. Hydrogen gas readily burns in oxygen or air with formation of vapor of water. The quantity of heat evolved, according to Thomsen, amounts to 34,116 units for every unit of weight of hydrogen burned, which means that, supposing the two gases were originally at the temperature of, say, 0°C ., to bring the hot steam produced into the condition of liquid water of 0°C ., we must withdraw from it a quantity of heat equal to that necessary to raise 34,116 units of weight of liquid water from 0° to 1°C . This heat-disturbance is quite independent of the particular mode in which the process is conducted; it is the same, for instance, whether pure oxygen or air be used as reagent, being neither more nor less than the balance of energy between one part of hydrogen plus eight parts of oxygen on the one hand and nine parts of liquid water on the other. The temperature of the flame, on the other hand, does depend on the circumstances under which the process takes place. It obviously attains its maximum in the case of the firing of pure "oxygen" gas (we mean a mixture of hydrogen with exactly half its volume of oxygen, the quantity it combines with in becoming water). It becomes less when the "oxyhydrogen" is mixed with excess of one or the other of two co-reagents or an inert gas such as nitrogen, because in any such case the same amount of heat spreads over a larger quantity of matter.

Bunsen exploded fulminating gas mixtures in a close vessel constructed so that the maximum tension attained by the gas-contents during the combustion could be observed and measured, and from this value and the analytical data he calculated the maximum temperature and the proportion of gas-mixture which had assumed the form of a chemical compound at the moment when the maximum temperature prevailed.

OXYNOTUS, the name of a genus of birds now ascertained to be peculiar to two of the Mascarene Islands—Mauritius and Réunion (Bourbon)—where the name of *Cuisinier* is applied to them, and remarkable for the fact, almost if not quite unique in ornithology, that, while the males of both species are almost identical in appearance, the females are wholly unlike each other. Though the habits of the Mauritian species, *O. rufiventer*, have been very fairly observed, there seems to be nothing in them that might account for the peculiarity. The genus *Oxynotus* is generally placed in the group known as *Campophagida*, most or all of which are distinguished from *Laniida* (to which they seem nearly allied) by the feathers on the lower part of the back and on the rump having the basal portion of the shaft very stiff and the distal portion soft—a structure which makes that part of the body, on being touched by the finger, feel as though it were beset with blunt prickles. Hence the name of the genus, intended to signify "prickly back." The males, which look rather like miniature gray shrikes (*Lanius excubitor* and others), are—except on close examination, when some slight differences of build and shade become discernible—quite indistinguishable; but the female of the one species has a reddish-brown back, and is bright ferruginous beneath, while the female of the other species is dull white beneath, transversely barred, as are the females of some shrikes, with brown.

OVER AND TERMINER, in English law, is one of the commissions by which a judge of assize sits (see ASSIZE). By the commission of oyer and terminer the commissioners (in practice the judges of assize, though other persons are named with them in the commission) are commanded to make diligent inquiry into all treasons, felonies, and misdemeanors whatever committed in the counties specified in the commission, and to hear and determine the same according to law. The inquiry is by means of the grand jury; after the grand jury has found the bills submitted to it, the commissioners proceed to hear and determine (oyer and terminer) by means of the petit jury. The words oyer and terminer are also used to denote the court which has jurisdiction to try offenses within the limits to which the commission of oyer and terminer extends.

In the United States oyer and terminer is the name given to courts of criminal jurisdiction in some States, e.g., New York, New Jersey, Pennsylvania, and Georgia.

OYSTER. The use of this name in the vernacular is equivalent to that of *Ostrea* in zoölogical nomenclature; there are no genera so similar to *Ostrea* as to be confounded with it in ordinary language. *Ostrea* is a genus of Lamellibranch Molluscs, belonging to the third order *Monomya*, the valves of its shell being closed by a single large adductor muscle. The degeneration produced by sedentary habits in all lamellibranchs has in the oyster reached its most advanced stage. The muscular projection of the ventral surface called the foot, whose various modifications characterize the different classes of *Mollusca*, is almost entirely aborted. The two valves of the shell are unequal in size, and of different shape; the left valve is larger, thicker, and more convex, and on it the animal rests in its natural state. This valve, in the young oyster, is attached to some object on the sea-bottom; in the adult it is sometimes attached, sometimes free. The right valve is flat, and smaller and thinner than the left. In a corresponding manner the right side of the animal's body is somewhat less developed than the left, and to this extent there is a departure from the bilateral symmetry characteristic of lamellibranchs.

The organization of the oyster, as compared with that of a typical lamellibranch such as *Anodon* (see

MOLLUSCA), is brought about by the reduction of the anterior part of the body accompanying the loss of the anterior adductor, and the enlargement of the posterior region. The pedal ganglia and auditory organs have disappeared with the foot, at all events have never been detected; the labial ganglia are very minute, while the parieto-splanchnic are well developed, and constitute the principal part of the nervous system.

The generative organs of the oyster consist of a system of branching cavities on each side of the body lying immediately beneath the surface. All the cavities of a side are ultimately in communication with an efferent duct opening on the surface of the body a little above the line of attachment of the gills. The genital opening on each side is situated in a depression of the surface into which the renal organ also opens. The genital products are derived from the cells which line the cavities of the genital organs. It has been shown that in the same oyster the genital organs at one time produce ova, at another, spermatozoa, and that consequently the oyster does not fertilize itself. How many times the alternation of sex may take place in a season is not known. The breeding season of the European oyster lasts from May to September. The rate of growth of the young oyster is, roughly speaking, an inch in diameter in a year, but after it has attained a breadth of three inches its growth is much slower. Oysters over twenty years of age are rare, and most of the adult Schleswig oysters are seven to ten years old.

The development of the American oyster, *O. virginiana*, and of the Portuguese oyster, *O. angulata*, is very similar to that of *O. edulis*, except that there is no period of incubation within the mantle cavity of the parent in the case of these two species. Hence it is that so-called artificial fertilization is possible; that is to say, the fertilization may be allowed to take place in a tank or aquarium, in which the conditions are under control. But if it is possible to procure a supply of spat from the American oyster by keeping the swarms of larvæ in confinement, it ought to be possible in the case of the European oyster. All that would be necessary would be to take a number of mature oysters containing white spat and lay them down in tanks until the larvæ escape. This would be merely carrying oyster culture a step further back, and instead of collecting the newly-fixed oysters, to obtain the free larvæ in numbers and so insure a fall of spat independently of the uncertainty of natural conditions.

Natural beds of oyster occur on stony and shelly bottoms at depths varying from three to twenty fathoms. In nature the beds are liable to variations, and it seems that they are easily brought into an unproductive condition by over-dredging. Oysters do not flourish in water containing less than three per cent. salt; hence they are absent from the Baltic. The chief enemies of oysters are the dog-whelk, *Purpura lapillus*, and the whelk-tingle, *Murex erinaceus*, which bore through the shells. Starfishes swallow oysters whole. *Cliona*, the boring sponge, destroys the shells and so injures the oyster; the boring annelid *Leucodore* also excavates the shell.

The wandering life of the larvæ makes it uncertain whether any of the progeny of a given oyster-bed will settle within its area and so keep up its numbers. It is known from the history of the Liimfjord beds that the larvæ may settle five miles from their place of birth.

The genus *Ostrea* has a world-wide distribution, in tropical and temperate seas; seventy species have been distinguished. Its nearest allies are the *Anomia* among living forms, *Gryphaea* among fossils. For the so-called Pearl Oyster, see PEARL.

The oyster industry of the world is seated chiefly in the United States and France. Great Britain has still a few natural beds remaining, and a number of well-conducted establishments for oyster culture. Canada, Holland, Italy, Germany, Belgium, Spain, Portugal, Denmark, Norway, and Russia have also oyster industries, which are comparatively insignificant.

The oyster industry is by far the most extensive of the fishery industries of the United States, yielding products three times as valuable as those of the cod fishery and six times those of the whale fishery. In 1880 it employed 52,805 persons, and yielded 22,195,370 bushels, worth to the fishermen \$9,034,861. On 13,047,922 bushels there is a rise of value in passing from producers to market, which amounts to \$4,368,991, and results either from replanting or from packing in tin cans. The value of the capital invested in the industry is returned as \$10,583,295. There are employed 4,155 vessels, valued at \$3,528,700, and 11,930 boats. The actual fishermen number 38,249, the shoresmen 14,556. Fully 80 per cent. of the total yield is obtained from the waters of Chesapeake Bay. Since these figures were received the industry has very greatly increased.

The oyster industry is rapidly passing from the hands of the fisherman into those of the oyster culturist. The oyster being sedentary, except for a few days in the earliest stages of its existence, is easily exterminated in any given locality; since, although it may not be possible for the fishermen to rake up from the bottom every individual, wholesale methods of capture soon result in covering up or otherwise destroying the oyster banks or reefs, as the communities of oysters are technically termed. At present the oyster is one of the cheapest articles of diet in the United States; and, though it can hardly be expected that the price of American oysters will always remain so low, still, taking into consideration the great wealth of the natural beds along the entire Atlantic coast, it seems certain that a moderate amount of protection will keep the price of seed oysters far below European rates, and that the immense stretches of submerged land especially suited for oyster planting may be utilized and made to produce an abundant harvest at much less cost than that which accompanies the complicated system of culture in vogue in France and Holland.

Oysters cannot thrive where the ground is composed of moving sand or where mud is deposited; consequently, since the size and number of these places are very limited, only a very small percentage of the young oysters can find a resting-place, and the remainder perish. By putting down suitable "cultch" or "stools" immense quantities of the wandering fry may be induced to settle, and are thus saved. As a rule the natural beds occupy most of the suitable space in their own vicinity. Unoccupied territory may, however, be prepared for the reception of new beds, by spreading sand, gravel, and shells over muddy bottoms, or, indeed, beds may be kept up in locations for permanent natural beds, by putting down mature oysters and cultch just before the time of breeding, thus giving the young a chance to fix themselves before the currents and enemies have had time to accomplish much in the way of destruction.

The collection of oyster spat upon artificial stools has been practiced from time immemorial. As early as the seventh century, and probably before, the Romans practiced a kind of oyster culture in Lake Avernus, which still survives to the present day in Lake Fusaro. Piles of rocks are made on the muddy bottoms of these salt-water lakes, and around these are arranged circles of stakes to which are often attached bundles of twigs. Breeding oysters are piled upon the rookeries, and their young become attached to the stakes and twigs provided

for their reception, where they are allowed to remain until ready for use, when they are plucked off and sent to the market. A similar though ruder device is used in the Poquonnock river in Connecticut. Birch-trees are thrown into the water near a natural bed of oysters, and the trunks and twigs become covered with spat; the trees are then dragged out upon the shore by oxen, and the young fry are broken off and laid down in the shallows to increase in size.

American oyster culture, as practiced in the "East River" (the western end of Long Island Sound), in eastern Connecticut, and to some extent in Long Island and New Jersey, is eminently successful and profitable, and there seems to be no reason to doubt its permanence, conducted as it is in close proximity to the natural beds, and with due regard for preservation. In the Long Island Sound alone, in 1879, the labors of 1,714 men produced 997,000 bushels, or perhaps 250,000,000 of native oysters, valued at \$847,925, while all France produced in the following season 375,000, worth about \$412,000. There was also a side product of 450,000 bushels (122,000,000) of transplanted oysters, worth \$350,000, handled by the same men in the American beds, while France employed an additional force of 28,000 people to produce 305,000,000 artificially bred oysters, worth \$3,179,000. The Long Island Sound system consists simply in distributing over the grounds, just before the spawning season, quantities of old oyster shells to which the young oysters become attached, and left undisturbed for from three to five years, when, having reached maturity, they are dredged for use. Spawning oysters are frequently put down in the spring, two months before the ground is shelled; this is done even when the natural beds are near, but is not so essential as when a rather remote piece of bottom is to be colonized.

In the United States an extensive business is carried on in laying down seed oysters from the Chesapeake Bay in the estuaries of southern New England and the Middle States.

Oyster-culturists practice in many places what is called "plumping," or puffing up oysters for market by exposing them for a short time to the effects of water fresher than that in which they grew. By this process the animal does not acquire any additional matter except the water, which is taken up in great amount, but it loses a part of its saltiness, and, in flavor, becomes more like an oyster from brackish waters.

OYSTER-CATCHER, a bird's name which does not seem to occur in books until 1731, when Catesby (*Nat. Hist. Carolina*,) used it for a species which he observed to be abundant on the oyster-banks left bare at low water in the rivers of Carolina, and believed to feed principally upon those mollusks. In 1776 Pennant applied the name to the allied British species, which he, and for nearly two hundred years many other English writers, had called the "Sea-Pie." The change, in spite of the misnomer—for, whatever may be the case elsewhere, in England the bird does not feed upon oysters—met with general approval, and the new name has, at least in books, almost wholly replaced what seems to have been the older one. The Oyster-catcher of Europe is the *Hæmatopus ostralegus* of Linnæus, belonging to the group now called *Limicolæ*, and is generally included in the family *Charadriidæ*; though some writers have placed it in one of its own, *Hæmatopodidæ*, chiefly on account of its peculiar bill—a long, thin wedge, ending in a vertical edge. Its feet also are much more fleshy than are generally seen in the plover family. In its strongly-contrasted plumage of black and white, with a coral-colored bill, the Oyster-catcher is one of the most conspicuous birds of the European coasts, and in many

parts is still very common. It is nearly always seen paired, though the pairs collect in prodigious flocks; and when these are broken up, its shrill but musical cry of "tu-lup," "tu-lup," somewhat pettishly repeated, helps to draw attention to it. Its wariness, however, is very marvelous, and even at the breeding-season, when most birds throw off their shyness, it is not easily approached within ordinary gunshot distance. The hen-bird commonly lays three clay-colored eggs, blotched with black, in a very slight hollow on the ground, not far from the sea. As incubation goes on the hollow is somewhat deepened, and perhaps some halm is added to its edge, so that at last a very fair nest is the result. The young, as in all *Limicolæ*, are at first clothed in down, so mottled in color as closely to resemble the shingle to which, if they be not hatched upon it, they are almost immediately taken by their parents, and there, on the slightest alarm, they squat close to elude observation. The Oyster-catcher is not highly esteemed as a bird for the table.

Differing from this species in the possession of a longer bill, in having much less white on its back, in the paler color of its mantle, and in a few other points, is the ordinary American species, already mentioned, *Hæmatopus palliatus*. Except that its call-note is unlike that of the European bird, the habits of the two seem to be perfectly similar; and the same may be said indeed of all the other species.

OZAKA, or OSAKA, one of the three imperial cities of Japan (Kioto and Tokio or Yedo being the other two), is situated in a plain in the province of Settsu or Sessliu, measuring about twenty miles from north to south and from fifteen to twenty miles east and west, and bounded, except toward the west, where it opens on Idzuminada Bay, by hills of considerable height. It lies on both sides of the Yodogawa, or rather of its headwater the Aji (the outlet of Lake Biwa), and is so intersected by river-branches and canals as to suggest a comparison with Venice or Stockholm. River steamers ply between Ozaka and its port, Hiogo or Kobe, and a railway between the two places, opened in 1873, has since been extended to Kioto and farther. The streets are not very broad, but for the most part they are regular and well kept. Shin-sai Bashi Suji, the principal thoroughfare, leads from Kitahama, the district lying on the south side of the Tosabori, to the iron suspension bridge (Shin-sai Bashi) over the Dotom-bori. The foreign settlement is at Kawaguchi, at the junction of the Shirinashi-gawa and the Aji-Kawa. It is almost deserted by the foreign merchants, who prefer to have their establishments at Kobe, but it is the seat of a number of European mission stations. Though the Buddhist temples of Ozaka number 1,380 and the Shinto temples 538, few of them are of much note. The principal secular buildings are the castle, the mint, and the arsenal. Externally the whole castle is protected by a double enceinte of high and massive walls and broad moats—the outer moat from 80 to 120 yards across and from 12 to 24 feet deep. Huge blocks of granite forty feet by ten or twenty feet occur in the masonry. The mint covers an area of forty acres, and employs about 600 persons. It was opened in 1871. Both cannon and guns are manufactured in the arsenal. Apart from these government establishments Ozaka is the seat of great industrial activity, possessing iron foundries, copper foundries, and rolling-mills, antimony-works, large glassworks, paper-mills, a sugar refinery, a cotton-spinning mill, rice-mills, an oil factory, sulphuric-acid works, match factories, soapworks, saké distilleries, a brewery (after the German pattern), shipyards, etc. Bronzes, sulphuric acid, and matches are among its chief exports.

In the surrounding district large quantities of rapeseed are grown. The population in 1889 was 290,105.

OZANAM, ANTOINE FRÉDÉRIC, the greatest name, as far as literary and historical criticism is concerned, of the Neo-Catholic movement in France during the first half of the nineteenth century, was born at Milan on April 13, 1813. His family is said to have been of Jewish extraction, and has a circumstantial though possibly fabulous genealogy of extraordinary length. He studied law in Paris, where he fell in with the Ampère family, and through them with excellent literary society. He was called to the bar, and in 1838 won his doctor's degree in letters with a thesis on Dante, which was the beginning of his best-known book. A year later he was appointed to a professorship of commercial law at Lyons, and in another year assistant professor to Fauriel at the Sorbonne. At Fauriel's death, in 1844, he succeeded to the full professorship of foreign literature. He died of consumption on September 8, 1853, at the age of forty.

OZOCERITE, or OZOKERITE, is a combustible mineral which may be designated as crude native PARAFFIN (*q.v.*), found in many localities in varying degrees of purity. The only commercial sources of supply, however, are in Galicia, principally at Boryslaff and Dzwieniasz. At and near Baku and in other places about the Caspian Sea, soft oily native paraffins, known as "nefto-gil" or "nefte-degil" and "kir," are found with other petroleum products. The theory of the formation of ozocerite now generally accepted is that it is a product of the decomposition of organic substances, which was originally like petroleum, but has lost its more volatile components by volatilization. All native petroleum in fact, like crude paraffin oil, holds solid paraffin in solution.

The purified paraffin of ozocerite makes excellent

candles, which are said to give more light, weight for weight, than those made from ordinary paraffin, besides being less easily fusible. Under the name of ceresin or ozocerotin a large proportion of the high-melting paraffin extracted from the mineral goes into commerce, to be used chiefly for the adulteration of beeswax. The various methods of refining used furnish certain proportions of soft paraffin, and of heavy and light oils as by-products, which take their place in commerce beside the corresponding products from shale and petroleum.

OZONE. From the time of Van Marum (1785), at least, it was known that the passage of electric sparks through air is accompanied by the production of a peculiar smell; but the cause of this remained unknown until 1840, when Schönbein observed that a similar smell is exhibited by electrolytic oxygen (as obtained in the electrolysis of acidulated water), and also develops in the atmosphere of a vessel in which phosphorus suffers spontaneous oxidation at ordinary temperatures in the presence of water. The three kinds of odoriferous gas, he found, had the power of decomposing iodide of potassium with liberation of iodine, and they agreed also in their behavior to other reagents, whence he concluded that in all the three cases the smell was owing to the same peculiar substance, which he called *ozone*. The merit of having discovered the true elementary composition of ozone belongs to Marignac and De la Rive, who proved that it can be produced, as easily and abundantly as in any other way, by the electrification of absolutely pure oxygen gas, whence it at once followed that—unless oxygen be a compound of two or more unknown elements—ozone cannot be anything else than an allotropic modification of oxygen.

P.

P is the sixteenth letter of our alphabet. The sound it denotes is a closed labial, differing from *b* as a surd from a sonant; it is heard only when the lips open; there is then a percussion as the breath escapes, which constitutes the sound. The difference between breath and voice can be easily seen in the production of the two sounds, *p* and *b*. When the lips are closed—as they must be closed (exactly in the same way) for each of the sounds—if we then try to articulate *p*, no effort can produce any kind of sound till the lips open; the *chordæ vocales* do not vibrate, and there is, therefore, nothing in the mouth but mere breath. But if we make as though we would sound *b*, while still keeping the lips shut, a certain dull sound is quite audible, produced by the vocalized breath (or voice) within the mouth; and the action of the top of the larynx in producing this sound may be distinctly felt. Of course this sound is not a *b*; that does not come till the lips part.

It is noteworthy how very small is the number of pure English words which begin with *p*. Such words correspond to words which began with *b* in Greek, Latin, and other members of the parent Aryan speech; and these are equally few. Nearly all of the words which we have in English beginning with *p* are therefore borrowed, such as "pain," "pair," "police," which came to us from France; others are scientific terms, oftenest modeled upon the Greek. The reason of this deficiency of words in the parent language commencing with *b* is not easy to find.

PACCHIA, GIROLAMO DEL, and PACCHIAROTTO (or **PACCHIAROTTI**), **JACOPO**. These are two painters of the Sienese school, whose career and artwork have been much misstated till late years. One or other of them produced some good pictures, which used to pass as the performance of Perugino; reclaimed from Perugino, they were assigned to Pacchiarotto; now it is sufficiently settled that the good works are by G. del Pacchia, while nothing of Pacchiarotto's own doing transcends mediocrity. The mythical Pacchiarotto who worked actively at Fontainebleau has no authenticity.

Girolamo del Pacchia, son of a Hungarian cannon-founder, was born, probably in Siena, in 1477, and nothing of a later date is known about him. His most celebrated work is a fresco of the Nativity of the Virgin, in the chapel of S. Bernardino, Siena, graceful and tender, with a certain artificiality.

Pacchiarotto was born in Siena in 1474. In 1530 he took part in the conspiracy of the Libertini and Popolani, and died about 1541. Among the few extant works with which he is accredited is an *Assumption of the Virgin*, in the Carmine of Siena.

PACHECO, FRANCISCO, Spanish painter and art historian, born at Seville in 1571, was the pupil of Luis Fernandez, and a diligent and prolific workman. Favorable specimens of his style are to be seen in the Madrid picture gallery, and also in two churches at Alcala de Guadaira, near Seville. He died in 1654.

PACHOMIUS, or PACHUMIUS. See **MONACHISM**.
PACHYDERMATA. See **MAMMALIA**.

PACIFIC OCEAN. The ancient world was ignorant of the existence of the vast expanse of water now known as the Pacific Ocean. In Ptolemy's map of the world, constructed in the second century of our era, this fact is clearly brought out, for the only space which might possibly represent the Pacific is the *Magnus Sinus*, a sea so limited in extent, and represented in such a position, that it probably stands for the Gulf of Siam in the Indian Ocean.

Vague reports of a great ocean lying beyond China were current in Europe as early as the period of Arabian supremacy in learning. Indeed an Arab merchant named Sulaiman, who visited China in the ninth century, declared that he had sailed upon it. But for several hundred years the reports continued so uncertain, and were so loaded with the wild extravagance of travelers' tales of the period, that it is difficult to get at the facts from which they probably took their origin. During the thirteenth and fourteenth centuries Marco Polo and his successors traveled far to the East and came to an ocean of the extent of which they were ignorant, but they partially explored its western coasts. The East was the region toward which all the commerce and enterprise of the Middle Ages tended, and it was the hope of finding a safer and shorter sea-route to India that led the Spanish court, in 1492, to furnish Columbus with a fleet for the exploration of the Western Ocean. Although convinced of the spherical form of the earth, he greatly underrated its size, and, accepting the popular estimate of the great breadth of the Asiatic continent, he set out on his voyage confident of soon reaching "the Indies." The glowing descriptions of his discoveries in that strange new world of the West that rose up before him to bar his advance immediately attracted the attention of adventurous Spanish mariners. Headed by Columbus himself, they cruised intrepidly among the Caribbean Islands, still lured by the hope of discovering some western passage to the coveted East. Columbus found that what he at first considered a labyrinthine archipelago was a continent of vast extent, but not Asia, and died without knowing what lay beyond. Spain and Portugal were the rival maritime powers at that time, and both took up the search for new countries with great ardor. Pope Alexander VI., in 1493, fearing that the two nations would quarrel over their colonies, assigned all the new lands that might be discovered west of the Azores to Spain, and all east of those islands to Portugal. The Portuguese, accepting the gift, followed Vasco da Gama in opening up the road to India by the Cape of Good Hope, and pushed forward their trading and piratical excursions into the west Pacific far beyond the Spice Islands. The Spaniards confined themselves to the New World, visiting, naming, and plundering the West India Islands and the headlands of Central America.

On September 29, 1513, Vasco Nuñez de Balbao, the leader of a Spanish party exploring the Isthmus of Panama, saw, from the summit of a mountain, a vast ocean stretching to the west—the very ocean of whose existence Columbus was certain, and which he had so long tried vainly to discover. Because he first saw it on Michaelmas day, Balbao named it the *Golfo de San Miguel*. Magellan, following the east coast of America farther to the south than any previous explorer, sailed on, in spite of terrific storms, until he found the strait which now bears his name, and, steering carefully through it, on November 27, 1520, he swept into the calm waters of that new sea on which he was the first to sail, and which he named the *Mar Pacifico*.

The victories of Cortez in Mexico about the same date opened the way for the exploration of the west coast of America, where Pizarro's conquest of Peru in 1526 gave the Spaniards a firm footing. From this time an intermittent trade sprang up between Europe and the Pacific through Magellan Strait, and latterly around Cape Horn. Beforelong English fleets, attracted more by the prospect of plundering Spanish galleons than of discovering new territories, found their way into the Pacific. Sir Francis Drake, like Balbao, saw the ocean from the Isthmus of Panama. He entered the Pacific in September, 1577, being the first Englishman to sail upon it; some months later he sailed across it to the Moluccas. Alvaro de Mardana, who preceded him, had discovered the Solomon Islands in 1567.

Tasman, Roggewein, Dampier, and other explorers of the seventeenth century discovered Australia, New Zealand, Tasmania, and many smaller groups of islands. During the eighteenth century the voyages of Anson, Bass, Behring, the two Bougainvilles, Broughton, Byron, Cook, La Pérouse, and many more practically completed the geographical exploration of the Pacific Ocean. In the beginning of that century the Pacific had a curious fascination for commercial speculators, and the ill-fated Scottish colony founded at Darien in 1698 seemed only to prepare the way for the English South Sea bubble that burst in 1720. All the navigators who explored these seas believed in the existence of a northwest passage between the Atlantic and Pacific, and made attempts to find it; but its discovery baffled all enterprise until 1850, when Maclure proved that there was such a channel, but that the ice prevented its being of any commercial utility. In the present century D'Entrecasteaux, Krusenstern, Beechy, Fitzroy, and Bennet have taken the lead among geographical explorers in the Pacific, although the ranks contain many names scarcely less worthy of remembrance. Within recent years several purely scientific exploring expeditions and British surveying vessels have examined the Pacific, investigating its depth, the nature and form of the bottom, the temperature of the water at various depths and its density, as well as the marine fauna and flora. Of those expeditions the voyages of the *Challenger*, *Gazelle*, and *Tuscarora* are the most important.

The Pacific Ocean is bounded on the north by Behring Strait and the coasts of Russia and Alaska, on the east by the west coasts of North and South America; on the south the imaginary line of the Antarctic Circle divides it from the Antarctic Ocean, while its western boundary is the east coast of Australia, the Malay Archipelago separating it from the Indian Ocean, and the eastern coasts of the Chinese empire. Some modern geographers place the southern limit of the Atlantic, Pacific, and Indian Oceans at the 40th parallel, and name the body of water which surrounds the earth between that latitude and the Antarctic Circle the Southern Ocean.

Although differing from the Atlantic in its general form, being more nearly land-locked to the north, the Pacific resembles it in being open to the south, forming, in fact, a great projection northward of that vast southern ocean of which the Atlantic is another arm.

The Pacific is the largest expanse of water in the world, covering more than a quarter of its superficies, and comprising fully one-half of its water surface. It extends through 132 degrees of latitude, in other words it measures 9,000 miles from north to south. From east to west its breadth varies from about forty miles at Behring Strait, where Asia and America come within sight of each other, to 8,500 miles between California and China on the Tropic of Cancer, and to more than 10,000 miles on the Equator between Quito and the Moluccas, where the ocean is widest. The area has been variously estimated at from 50,000,000 to 100,000,000 square miles; but, defining its boundaries as above, Keith Johnston, from careful measurements, estimated it, with probably a near approach to the truth, at 67,810,000 square miles.

The coast-line of the Pacific and Indian Oceans, taken together, only amounts to 47,000 miles, that of the Atlantic alone measures 55,000, the smaller ocean more than making up for its less extent by its numerous inland seas and inlets of smaller size. Speaking broadly, the eastern boundary of the Pacific is rugged, barren, mountainous, and singularly free from indentations, while its western shores are low, fertile, and deeply indented with gulfs and partially inclosed seas. Behring Strait unites the Arctic Ocean with the Sea of Kamchatka, or Behring Sea, which is bounded on the east by the irregular, low, swampy shores of Alaska, and on the south by the Alaskan peninsula and the Aleutian Islands. Along British North America the coast is rugged, rocky, considerably indented, and, between the parallels of 50° and 60° N. latitude, fringed with islands. The largest of these are Vancouver Island in the Gulf of Georgia, Queen Charlotte Island, Prince of Wales Island, and the islands of King George III.'s Archipelago. The Gulf of California runs northward in the Mexican coast, reaching from 23° to 32° N. latitude. It is the one important inlet on the whole west coast of America—the only others which are worth naming being the Gulf of Panama and the Gulf of Guayaquil. The Mexican shore is low, and contrasts with the coasts to the north and to the south, which are generally steep and rocky, though there are occasional sandy beaches in Peru and Chili. The breadth of the plain between the Rocky Mountains and the sea gradually diminishes toward the south, and the mountain chain of the Andes runs close along the west coast of South America to the very extremity of the continent.

A series of volcanoes, active and extinct, runs around the Pacific, commencing at Cape Horn, passing along the Andes and Rocky Mountains, crossing from the American continent by the Aleutian Islands to Kamchatka, and thence southward by Japan and the East Indian Archipelago to New Zealand. Earthquakes are frequent all along this line.

There are few islands near the American coast north of Patagonia, and these are small and unimportant; but south of the fortieth parallel there is a complete change. The end of the continent seems as if it had been shattered; there are abrupt bays and jagged chasms; archipelagos of small islands rise up in splintered fragments along the shore. The Strait of Magellan forms a tortuous channel between the mainland and the rocky, storm-beaten islands of Tierra del Fuego.

The drainage area of the Pacific Ocean is estimated at 8,660,000 square miles, while that of the Atlantic amounts to more than 19,000,000; the chief reason for

this disparity is that only half a million square miles of the American continent are drained into the Pacific, the remaining six and a half millions being connected with the Atlantic river-system, and it is estimated that only one-seventh of the area of the Asiatic continent drains into the Pacific Ocean. The huge wall of the Andes practically reduces the Pacific rivers of South America to the rank of mountain streams; the Biobio and the Maypu in Chili are the only ones exceeding 100 miles in length—the former having a course of 180, the latter 160 miles. The Rocky Mountain chain, which forms the watershed of North America, runs parallel to the Pacific coast at a distance of about 1,000 miles, and the Cascade and minor ranges which skirt the shore are broken through in several places to give passage to rivers that are, in some cases, of considerable size. The Colorado rises in the State of that name, at the base of the Rocky Mountains, flows southwest through Utah and Arizona, and falls into the head of the Gulf of California. Its course measures about 1,100 miles, and it drains a rugged and barren area of 170,000 square miles. California has only one river, the Sacramento, 420 miles long. The Oregon (or Columbia) is formed by the union of two streams rising in the Rocky Mountains, one in British Columbia, the other in Idaho. It is a swift-flowing river, full of rapids and cataracts, and, though it is only 750 miles long, the area which it drains is greater by one-seventh than that drained by the Colorado. The ebb and flow of the tide are perceptible for a hundred miles from the mouth of the Oregon, and the river is navigable for that distance. The Frazer, which has a length of 600 miles, flows southward through British Columbia from the Rocky Mountains, and enters the sea in the Gulf of Georgia opposite Vancouver Island, carrying off the rainfall of 98,000 square miles. The northern limit of the American mountain chains is marked by the rise of the great river Yukon, which traverses Alaska; and, after a run of more than 2,000 miles, it enters Behring Sea opposite the island of St. Lawrence. Its tributaries have not been fully explored, so the area which they intersect is unknown, but probably it is very large.

The region of calms between the north and south trades in the Pacific is narrower, more irregular, and less clearly marked than the corresponding belt in the Atlantic. In the East Pacific it lies, at all seasons, considerably north of the equator; but during the southern summer it is found south of the line in the western parts of the ocean, and disappears entirely in the northern summer, as the calms of the Indian Ocean do also. In January the low atmospheric pressure over the North Pacific produces winds which affect the climatological conditions of the shores in very different ways. At Vancouver Island the prevailing wind is southwest, and consequently the winter on the shores of British Columbia is mild and moist. The opposite coast of Asia is visited during the same season by northerly winds—northeast in Alaska, north-northeast in Kamchatka, and northwest in Japan; and, as a result, the weather in these regions in winter is dry and bitterly cold. The West Pacific and the Indian Ocean are the regions of monsoons—winds that blow as steadily as the trades, but which change their direction with the season. During the periods of transition the steady breeze gives place to variable winds, occasional calms, and sometimes terrific hurricanes. The general direction of the monsoons in the Pacific between April and October is southerly and southeasterly, and from November to April they blow from the northeast, and on nearing the continent of Asia from the northwest. Monsoonal winds are found connected with all continents; they are produced by the great differences in the temperature

and pressure which prevail over the land at different seasons as compared with the adjacent ocean. The monsoons give rise to oceanic currents which flow in the same direction as the wind, and like it run opposite ways during alternate half years. Although the velocity of the wind over the open sea is always greater than that near shore or on land, it was shown by the observations of the *Challenger*, in the Pacific and other oceans, that there is no distinct diurnal variation in the wind's force at sea, though very decided periods of maxima and minima were noticed in the vicinity of land.

The vast extent of the Pacific Ocean gives full scope for the current-producing action of tides and winds, while the smooth continental boundary on its eastern side, the numerous groups of islands which break its surface, and its indented western coast, combine to modify the direction of the main streams and to produce innumerable minor currents, some permanent, and others varying from time to time in velocity and direction. The bottom temperature in the Pacific is on the average about 1° F. lower than that in the Atlantic.

The temperature of the water at the depth of 300 fathoms is nearly the same (40° to 45°) over the whole of the North Pacific, but above 300 fathoms the water is warmer in the western than in the central portion, while below that depth it is colder in the former than in the latter. The same phenomenon is noticed between the latitudes of 34° S. and 40° S., but here 700 fathoms marks the plane of constant temperature. Between 33° N. and 40° S. the temperature of the water above 200 fathoms is higher in the North than in the South Pacific, while from 200 to 1,500 fathoms it is lower in the North, and below the latter depth the condition reverts to what it was above 200 fathoms.

The average depth of the Pacific is greater than that of the Atlantic, and areas of deeper water occur in it than in any other part of the globe. A line running along the western shores of the two Americas and along the eastern shores of the Asiatic continent more or less closely follows a great circle of the globe. On the one side of this line there are the continental masses of the Americas and of Europe and Asia, with an average height of about 800 feet above the level of the sea; and on the other side the vast oceanic depression of the Pacific, with an average depth of about 2,500 fathoms. The average level of the continental area may thus be regarded as about three miles above the Pacific depression.

ISLANDS.

The Pacific Ocean is distinguished from the Atlantic by the greater number of small island groups that diversify its surface. The islands of the Malay Archipelago, Australia, New Zealand, and probably New Caledonia belong to the class of continental islands. The true oceanic islands, on the other hand, have no direct geological connection with the continents; the older sedimentary and metamorphic rocks appear to be quite absent, the islands being either of eruptive or coral formation. The fauna and flora of the oceanic islands present a considerable amount of uniformity, though each island or important group of islands has its peculiar species. There is an entire absence of terrestrial Mammalia. The genera and species are few in number when compared with those of the continents and continental islands from which they would appear to have been originally derived by immigration, and subsequently to have undergone modification. Recent researches appear also to show that the dredgings around oceanic islands yield fewer genera and species than dredgings at similar depths along the shores of continents, although the numbers of individuals of a few species may be extraordinarily abundant.

The most northern oceanic group is the HAWAIIAN ARCHIPELAGO or SANDWICH ISLANDS (*q.v.*), stretching for about 340 miles between the latitudes of $18^{\circ} 52'$ and $22^{\circ} 15' N.$, and the meridians of $154^{\circ} 42'$ and $160^{\circ} 33' W.$ It consists of eight large islands—Hawaii (Owhyhee), Maui (Mowee), Kahului (Tahooroway), Lanai (Ranai), Molokai (Morotoi), Oahu (Woahoo), Kauai (Atooi), and Niihau (Oneehoow), and four small barren islets, the entire area being 6,100 square miles. The islands of this group are mountainous, and abound in active volcanoes; the great lake of fire, Kilauea, on the east side of the Mountain of Mauna Loa (13,760 feet), in Hawaii, is probably the largest active crater in the world, while one of the largest known extinct craters is that of Mauna Haleakala ("The House of the Sun"), in Maui, at a height of 10,200 feet above the sea; it is twelve miles in circumference. The Hawaiian Islands, being within the zone of coral formation, are surrounded by fringing reefs, and there is abundant evidence that gradual upheaval has taken place over the whole area which they occupy. There are beds of coral limestone in Molokai at a height of 400 feet, and in Kauai coral sand is found at an elevation of 4,000 feet above the sea; in many other islands coral and lava are found interstratified.

The three groups of the Bonin Islands, known as the Parry, Beechy, and Coffin groups, are composed of high rocky islets of a bold and fantastic outline, and are situated between 26° and $27^{\circ} N.$ latitude.

The LADRONES or Mariana Islands (*q.v.*) have a total area of 395 square miles; they stretch for nearly 450 miles between 13° and $20^{\circ} N.$ latitude, and $144^{\circ} 37'$ and $145^{\circ} 55' E.$ longitude. These islands are all of volcanic origin, and their mountains contain several active volcanoes.

The CAROLINE ARCHIPELAGO (*q.v.*) lies about 170 miles to the south of the Ladrones, and, together with the Pelew Islands, has an area of 877 square miles. The Carolines embrace forty distinct island groups, five of which are basaltic and mountainous, though surrounded by coral reefs; the remaining thirty-five groups are entirely of coral formation, and do not rise much above the sea-level. The Pelew Islands resemble the Carolines in their physical characteristics; they present peculiarities in the arrangement of atolls similar to the islands of the Low Archipelago.

The Marshall Islands (see MICRONESIA) consist of two chains running parallel to each other, and composed of fourteen and seventeen small groups respectively. They lie to the eastward of the Carolines, and are entirely of organic formation.

The GILBERT ARCHIPELAGO (*q.v.*) is cut by the equator. It contains sixteen groups of small coral islands, low and barren, but densely populated.

In the South Pacific oceanic islands are scattered with the greatest profusion over a region between 5° and $25^{\circ} S.$ latitude and 180° to $120^{\circ} W.$ longitude. The northern part of the shallow water surrounding Australia, New Zealand, and the Malay Archipelago is occupied by the Solomon Islands, the New Hebrides, the bold, rocky and mountainous islands of the Fiji with fine barrier reefs, the Friendly Islands, and Samoa or the Navigators' Islands. Farther to the south there are the Society Islands, including Tahiti; they are lofty, of volcanic origin, and surrounded by very perfect barrier reefs. The Marquesas or Mendana Archipelago, farther to the north, also consists of volcanic islands, but they are not fringed by reefs.

The volcanic group of the Galapagos Archipelago is situated under the equator at a distance of 500 or 600 miles from the west coast of South America; it has been minutely described by Darwin.

The extensive Low or Paumotu Archipelago lies to the southeast of the Society Islands, and runs parallel to them. It consists of about eighty atolls, some of them of large size, and all typical examples of this form of coral island.

The total area of the islands of the Pacific is exceedingly small, especially when the vast number of groups that stud the ocean is taken into consideration.

PACUVIUS, MARCUS, was the second in order of time of the three tragic poets who wrote for the Roman stage in the second century B.C. He was born in 219 B.C., when Livius Andronicus and Nævius were introducing their imitations of the Greek tragic and comic drama to Roman audiences; he was recognized as the chief tragic poet about the time when Cæcilius, and, after him, Terence, were the flourishing authors of Latin comedy; he continued to produce his tragedies till the advent of the younger poet Accius, who lived on till the youth of Cicero, and he died in the year 129 B.C., when Lucilius first appeared as an author. He obtained distinction as a painter. He died at the age of ninety.

PADANG. See SUMATRA.

PADERBORN, an ancient town of Prussia, the seat of a Roman Catholic bishop, is situated in the province of Westphalia and district of Minden, sixty miles to the southwest of Hanover. The most prominent building is the cathedral, the western part of which dates from the eleventh, the central part from the twelfth, and the eastern part from the thirteenth century. The externally insignificant chapel of St. Bartholomew ranks among the most interesting buildings in Westphalia, dating, as it does, from 1017, and possessing the characteristic features of the early architecture of that early period. The population in 1889 was 16,000.

PADIHAM, a township of Lancashire, England. Population, 9,000.

PADILLA, JUAN LOPEZ DE, insurrectionary leader in the "guerra de las comunidades" in which the commons of Castile made a futile stand against the arbitrary policy of Charles V. and his Flemish ministers, was the oldest son of the commendator of Castile, and was born in Toledo toward the close of the fifteenth century.

PADUA, a city of north Italy, on the river Bacchiglione, twenty-five miles west of Venice and eighteen miles southeast of Vicenza, with a population, in 1889, of 80,753. The city is a picturesque one, with arcaded streets and many bridges crossing the various branches of the Bacchiglione, which once surrounded the ancient walls. The Palazzo della Ragione, with its great hall on the upper floor, is reputed to have the largest roof unsupported by columns in Europe; the hall is nearly rectangular, its length $267\frac{1}{2}$ feet, its breadth 89 feet, and its height 78 feet; the walls are covered with symmetrical paintings in fresco; the building stands upon arches, and the upper story is surrounded by an open loggia, not unlike that which surrounds the basilica of Vicenza; the Palazzo was begun in 1172, and finished in 1219; in 1306 Fra Giovanni, an Augustinian friar, covered the whole with one roof. In the Piazza dei Signori is the beautiful loggia called the Gran Guardia, begun in 1493 and finished in 1526, and close by is the Palazzo del Capitano, the residence of the Venetian governors, with its great door, the work of Falconetto of Verona, 1532. The most famous of the Paduan churches is the basilica dedicated to Saint Anthony, commonly called Il Santo; the bones of the saint rest in a chapel richly ornamented with carved marbles, the work of various artists, among them of Sansovino and Falconetto; the basilica was begun about the year 1230, and completed in the following century. Padua has long been famous for its university, founded by Frederick II. in 1238. Under the rule of Venice the

university was governed by a board of three patricians called the Riformatori dello Studio di Padova. The list of professors and alumni is long and illustrious, containing, among others, the names of Bembo, Sperone Speroni, Veselius, Acquapendent, Galileo, Pomponazzi, Pole Scaliger, Tasso, and Sobieski. The place of Padua in the history of art is nearly as important as her place in the history of learning. The presence of the university attracted many distinguished artists, as Giotto, Lippo, Lippi, and Donatello; and for native art there was the school of Squarcione (1394-1474), whence issued the great Mantegna (1431-1506).

PADUCAH, city of the United States, the capital of McCracken county, Ky., on the south bank of the Ohio, at the mouth of the Tennessee river, is, next to Louisville, the most important commercial point in Kentucky. It is on the Chesapeake, Ohio and South-western railroad, and is the terminus for five lines of steamboats plying respectively to Evansville (Ind.), Cairo (Ill.), St. Louis (Mo.), Nashville (Tenn.), and Florence (Ala.), and a regular stopping point for other lines plying on the Ohio, Tennessee, and Mississippi rivers. It ships tobacco, whisky, pork, lumber, flour, and grain, and contains a number of tobacco factories and warehouses, marine-ways for the building and repair of steamboats, and manufactories of furniture, hubs and spokes, harness, leather, soap, and brooms. Laid out in 1827, Paducah was incorporated as a town in 1830, and as a city in 1856. It contains a courthouse, national banks, state bank, ten churches, a high school, grammar schools, rolling-mills, foundries, manufactories of chairs, furniture, tobacco, and plows and other farming implements. Paducah has also a university. The population was 2,428 in 1850, 4,590 in 1860, 6,866 in 1870, and 13,076 in 1889.

PÆSTUM, a Greek city in Lucania, Magna Græcia, near the sea, and about five miles south of the river Silarus (Sálso). It is said by Strabo to have been founded by Træzenian and Achæan colonists from the still older colony of Sybaris, on the Gulf of Tarentum; this probably happened not later than about 600 B.C. Herodotus speaks of it as being already a flourishing city in about 540 B.C., when the neighboring city of Velia was founded.

The ruins of Pæstum are among the most interesting of the Hellenic world. Remains of the city wall, sufficient to indicate the whole circuit, still exist. The main wall is sixteen feet six inches thick. The general design of this fortification much resembles the very perfectly preserved walls and towers of Messene in the Peloponnesus. Outside the north gate there is a long street of tombs, some of which have been excavated, and have yielded a number of interesting arms, vases, and mural paintings, mostly now in the museum at Naples. The chief glory of Pæstum is its wonderful group of three well-preserved Doric temples.

PAEZ, JOSÉ ANTONIO, one of the leaders of the struggle for South-American independence, and the first president of the republic of Venezuela, was born of Indian parents in the neighborhood of Acarigua, in the province of Barinas, and died in exile at New York, May 6, 1873. His military career, which began about 1810, was distinguished by the defeat of the Spanish forces at Mata de la Miel (1815), at Montecal and throughout the province of Apure (1816), and at Puerto Cabello (1823). At first he acted in concert with BOLIVAR (*q.v.*), but in 1829 he procured the secession of Venezuela from the Republic of Columbia. He was afterward President of Venezuela.

PAEZ, PEDRO, Jesuit missionary to Abyssinia, was born at Olmedo, in Old Castile, in 1564, and died 1622.

PAGANINI, NICOLÒ, the most extraordinary of ex-

ecutants on the violin, was born at Genoa, ~~February~~ 18, 1784. His father, a clever amateur, imbued him with a taste for music at a very early age. He first appeared in public at Genoa, in 1793, with triumphant success. In 1795 he visited Parma for the purpose of taking lessons from A. Rolla, who, however, said that he had nothing to teach him. On returning home, he studied more diligently than ever, practicing single passages for ten hours at a time, and publishing compositions so difficult that he alone could play them. After spending some years in close retirement, he started, in 1805, on a tour through Europe, astonishing the world with his matchless performances on the fourth string alone. In 1827 the pope honored him with the Order of the Golden Spur; and, in the following year, he extended his travels to Germany, beginning with Vienna, where he created a profound sensation. He first appeared in Paris in 1831; and on June 3d in that year he played in London, at the King's Theater. Here, as in other countries, he amassed a princely fortune, notwithstanding enormous losses caused by his unhappy propensity for speculation. In 1834 Berlioz composed for him his beautiful symphony, *Harold en Italie*. He was then at the zenith of his fame; but his health, long since ruined by excessive study, declined rapidly. In 1838 he suffered serious losses in Paris, yet generously presented Berlioz with 20,000 francs in return for his symphony. He died at Nice, May 27, 1840. Paganini's style was impressive and passionate to the last degree. His *cantabile* passages moved his audience to tears, while his *tours de force* were so astonishing that a Viennese amateur publicly declared that he had seen the devil assisting him. No later violinist has as yet eclipsed his fame as an executant, though he was far from realizing the artistic perfection so nobly maintained by Spohr and Joachim. The best of his imitators was his pupil Sivori.

PAHLAVÍ, or PEHLEVI, the name given by the followers of Zoroaster to the character in which are written the ancient translations of their sacred books and some other works which they preserve. The name can be traced back for many centuries; the great epic poet Firdausí, who belonged to the second half of the tenth Christian century, repeatedly speaks of Pahlaví books as the sources of his narratives, and he tells us among other things that in the time of the first Khosrau the Pahlaví character alone was used in Persia. The learned Ibn Mokaffa' calls Pahlaví one of the languages of Persia, and seems to imply that it is an official language. It is most suitable to confine the word, as is now generally done, to designate a kind of writing—not only that of the Pahlaví books, but of all inscriptions on stone and metal which use similar characters and are written on essentially the same principles as these books.

PAINE, THOMAS, the author of *The Rights of Man*, and *The Age of Reason*, would have had a very different kind of reputation if he had never written these works. The career of Paine is a very extraordinary one. The son of a Quaker staymaker, of Thetford in Norfolk, he had emigrated to the American colonies somewhat late in life, after erratically trying various ways of making a living, as a marine, an exciseman, a teacher of English, and acquiring a reputation in local political clubs by extreme views and vigor in debate. Born in 1736, he was thirty-eight when he arrived in America. He set the colonists aflame with a pamphlet entitled *Common Sense*, a most telling array of arguments for separation and for the establishment of a republic, conveyed in strong, unqualified language. There is a complete concurrence of testimony that Paine's pamphlet, issued on January 1, 1776, was a turning-

point in the struggle, that it roused and consolidated public feeling, and swept waverers along with the tide. The New York assembly appointed a committee to answer it, but the committee separated with the conclusion that it was unanswerable. When war was declared, and fortune at first went against the colonists, Paine, serving with Washington as a private soldier, composed by the light of campfires a short hortative tract, *The Crisis*, which was read to the army, and seems to have had a wonderful effect in restoring a courage that was considerably impaired by defeat. Its opening words, "These are the times that try men's souls," became a battle-cry. This and other literary services were recognized by Paine's appointment in the first Congress to be secretary of the committee on foreign affairs. The republic finally established, another phase of his turbulent career was entered on. He determined to return to England, and "open the eyes of the people to the madness and stupidity of the government." His chief effort in this propagandism was *The Rights of Man*, written as an answer to Burke's *Reflections on the Revolutions in France*. The first part appeared in 1791, and had an enormous circulation before the government took the alarm and endeavored to suppress it, thereby exciting the most intense curiosity to see it even at the risk of heavy penalties. Paine was indicted for treason, but before the trial came off he was elected by the department of Calais to the French Convention, and was allowed to pass into France followed by a sentence of outlawry. The first years that he spent in France form a curious episode in his life. As he knew little of the language, he could have had but little influence on affairs, but he was treated with great respect, and did what he could in the interests of moderation till he incurred the suspicion of Robespierre and was thrown into prison, escaping the guillotine by an accident. He completed the first part of the *Age of Reason* in the exciting interval between his accusation and his arrest, and put it into the hands of a friend on his way to prison. The publication of the work made an instant change in his position on both sides of the Atlantic, the indignation in the United States being as strong as in England. Washington, to whom he had dedicated his *Rights of Man*, declined to take any steps for his release from the prison of the Luxembourg, and he lay there for several months after the fall of Robespierre. The *Age of Reason* was written from the view of a Quaker who did not believe in revealed religion, but who held that "all religions are in their nature mild and benign" when not associated with political systems. Intermixed with the coarse, unceremonious ridicule of what he considered superstition and bad faith, are many passages of earnest and even lofty eloquence in favor of a pure morality founded on natural religion, fully justifying the bishop of Llandaff's saying: "There is a philosophical sublimity in some of your ideas when speaking of the Creator of the universe." The work, in short, represents the deism of the eighteenth century, in the hands of a rough, ready, passionate controversialist. Paine remained in France till 1802, and then returned to America, occupying the rest of his turbulent active life with financial questions and mechanical inventions. He died in 1809.

PAINT. See PIGMENT.

PAINTING. The painting-room has a great influence in determining not only the effects in the works of individual artists, but the characteristics of whole schools. Leonardo da Vinci was among the first to show partiality to indoor effects and deep shadows. Correggio, the artists of the Bolognese school, Caravaggio, Spagnoletto, and other Neapolitan and Spanish painters followed; the Dutch painter Rembrandt per-

haps carried these extreme contrasts of light and shade to the greatest length. The effects thus obtained are, however, more or less artificial, and very unlike the ordinary aspect of the open daylight face of nature.

Painters, unless there happens to be some special reason to the contrary, usually work with the light to the left to prevent the shadow cast from the brush falling inward. Some artists who seek to represent open-air effects paint from their models in glass houses, specially constructed for the purpose.

The *easel* is a frame, or rest, which supports the picture during its progress. Easels are of various kinds—the triangular, supplied with pegs for the adjustment of the height of the work; the square, or rack easel, which is much more convenient; and the French studio easel, having a screw at the back and worked by a handle in the front, by which arrangement pictures of considerable size and weight can be raised or lowered or inclined forward with great ease. There is also a variety of light portable easels used for out-door sketching. The *palette* is the board on which the colors are arranged to paint from; it is usually either of an oval or oblong square form, of light-colored wood, and, to avoid inconvenience being felt from its weight, it should be thin and well balanced on the thumb. It ought to be kept clean and the color never allowed to dry on it. The *palette-knife* has a pliable blade, and is used for arranging the colors on the palette, mixing tints, etc. With some painters it not infrequently takes the place of the brush in the application of color. The larger kinds of *brushes* are made of hog-hair. Brushes are also made of sable; these should have the property of coming to a fine point when required. Brushes of badger's hair are used for "softening" or "sweetening"—that is, blending the colors by sweeping lightly to and fro over them while freshly laid. The *mahl-stick* is used to steady the hand while painting details. It is held in the left hand, and the end of the stick, properly wadded, rests on the canvas. The *daïs* or *throne* is a platform varying from a foot to eighteen inches in height. Portrait painters, and artists who generally stand while at work, find it desirable to have the sitter or model nearly on a level with the eye. The *lay-figure*, a wooden or stuffed doll, usually life-size, is very serviceable in painting elaborate dresses and draperies. The best kinds are so constructed that they can be made to assume and retain any posture. Fra Bartolommeo first brought the lay-figure into use.

The materials used in paintings consist of canvases, prepared panels and millboards, oils, varnishes, and colors. Canvas is the material now generally used.

The introduction of oil painting on the modern methods dates from the time of John Van Eyck. This artist introduced a varnish, probably composed of linseed or nut oil mixed with some resinous substance, which was more siccative than the oil vehicles previously in use, and possessed the property of drying without exposure to the sun or to artificial heat. The oil painting of the early Flemish masters was, strictly speaking, (oil) varnish painting: an oleo-resinous substance, such as amber varnish, was mixed with the colors, and rendered final varnishing unnecessary. The Venetian painters also adopted this vehicle.

The permanent colors are the earths and ochers and those mineral colors which bear the test of fire and lime. Colors prepared from lead and animal and vegetable substances are more or less fugitive.

The natural or true pigments are prepared for use by calcining and washing, and for oil painting are ground up in poppy or linseed oils. With two or three exceptions the pigments derived from the mineral kingdom are the most permanent, especially those containing

iron or copper. Those derived from animal and vegetable substances have less permanence, but they form an important acquisition to the palette, as they not infrequently possess a purity and brilliancy of color which makes it almost impossible to dispense with them.

Colors are opaque or transparent. The former, on account of their solidity and opacity, are employed to represent light. For shadows and glazing transparent pigments are used. Yellow, red, and blue cannot be composed, and are called primary colors. The union of two of these in the three combinations of which alone they admit produces secondary colors. White represents light, and in oil painting the only white pigment used is white lead, prepared with great care. The ochers are the most permanent yellows. Their composition is very variable, but they may be considered true chemical combinations of clay and oxide of iron. The native ochers are yellow and red. By calcination the yellow ochers become red. Other yellows are prepared from arsenic, lead, and vegetable substances. Iron is the great coloring principle of red in nature. All the three kingdoms—mineral, animal, and vegetable—contribute to the red pigments. The first supplies vermilion and the red ochers; the second carmine, obtained from the cochineal insect; the third the madder pigments. The principal blue pigments are ultramarine, cobalt, smalt, Prussian blue, and indigo. Ultramarine is the only pure primary color. Cobalt is now prepared in a state of great purity, but it has the objection of appearing violet in artificial light.

There are various technical distinctions in the modes of applying the colors to a picture in its successive stages. *Glazing* is the laying of thinly transparent colors, diluted with a considerable quantity of the fluid used for bringing the pigments into a proper working state, which allows the work beneath to appear distinctly through, but tinged with the color of the glaze. *Scumbling* resembles glazing in that a very thin coat is spread lightly over portions of the work, but the color used is opaque instead of transparent. *Impasting* is the term applied to laying colors in thick masses on the lights. The shadows or dark portions of a picture are painted thinly and transparently, the lights solidly, with opaque colors. Impasting gives "texture" and "surface" to the latter, and helps to produce the appearance of roundness and relief.

The first principle in the application of paint is to avoid unnecessary mixing, or, as it is called, "troubling" or saddening the tints, the result of which is a waxy surface and muddiness of color. When this is avoided the touches are clear and distinct, but when the principle is carried to excess it degenerates into manner; or it may serve as a convenient screen for the want of accurate observation and thorough execution.

When painting in water-color was introduced, Indian ink was used in the earlier stages of the drawings, and they were finished with a few tints of thin color. At this period paintings in water-color were little more than flat washes. Improvements were gradually effected, first by varying the groundwork tint with blue and sepia, over which washes of color, commencing with a warm generalizing tint, were struck.

A great variety of papers is used in water-color painting, varying in texture from the extreme of roughness to hot-pressed smoothness. The paper most generally used is known as "Imperial," and is made of various degrees of texture and thickness.

The proper sizing of the paper is of great importance; if it is too strongly done, the colors will not float or work freely; if too little, they are absorbed into the fabric and appear poor and dead. In this last case, gum-arabic dissolved in warm water will improve the

effect by bringing up the color and giving greater depth and richness of tone. The paper is prepared to receive the drawing by being well sponged and stretched upon a drawing-board.

The earths and minerals are the most permanent pigments, but when employed with water they are more unmanageable, and flow less freely than the fugitive vegetable colors.

Brown sable is the hair generally used; but brushes are also made of red sable and squirrel or "camel" hair. The brushes are made by the insertion of the hair into quills, the various sizes of brush being recognized by the names of the birds which supply them—eagle, swan, goose, crow, etc.

PAINTING, HOUSE. See BUILDING and MURAL DECORATION.

PAISIELLO, or PAESIELLO, GIOVANNI, one of the most talented precursors of Rossini in the Italian school of musical composition, was born at Tarento, May 9, 1741. He wrote, among other productions, *La Pupilla*, *Il Mondo al Rovescio*, *Il Marchese di Tulipano*, *L'Idolo Cinese*, *Il Barbiere di Siviglia*, *Il Re Teodoro*, *Nina* and *La Molinara*. On June 5, 1815, he died.

PAISLEY, a municipal and parliamentary burgh of Renfrewshire, Scotland, is situated on both sides of the White Cart, seven miles west-southwest of Glasgow and seventeen east-southeast of Greenock. The abbey of Paisley was founded in 1164, originally as a priory, by Walter, great steward of Scotland.

Linen was manufactured at Paisley before the Union, shortly after which coarse linen cloths were succeeded by plain and figured lawns. About the beginning of the eighteenth century an important manufacturing industry is said to have been originated by Christian Shaw, daughter of the laird of Bargarren. She acquired great skill in the spinning of yarn, and, with the coöperation of a friend in Holland, originated the manufacture of fine linen thread. From 1760 till 1785 silk gauze was the principal manufacture. Muslin, cambric, and cotton thread next came into prominence. A wide range of worsted goods, mixed figured fabrics, and light figured muslins at present employ the looms. The spinning of thread and cotton is perhaps the industry for which the town is best known, although it is almost equally celebrated for its patent manufactures, including soap, starch, corn-flour, and preparations of coffee. There are also extensive bleachfields, large dye and print works, engineering works, and some shipbuilding. Since the beginning of the present century the population of the burgh has more than trebled. In 1889 it was 60,000.

PAJOU, AUGUSTIN, born at Paris on September 19, 1730, was a member of the Academy and a leading sculptor of the French school during the reigns of Louis XV. and Louis XVI. His portrait busts of Buffon and of Madame Du Barry, and his statuette of Bossuet (all in the Louvre), are among his best works. He died at Paris, May 8, 1809.

PAKHOI, or PEIHAI, a city and port of China, in the west of the province of Kwang-tung, situated on a bay of the Gulf of Tong-king, formed by a peninsula running southwest from the *fu* city of Lien-chow. Dating only from about 1820-30, and at first little better than a nest of pirates, Pakhoi rapidly grew into commercial importance, owing partly to the complete freedom which it enjoyed from taxation, and partly to the diversion of trade produced by the Tai-ping rebellion. Liquid indigo, sugar, anise-seed and anise-seed oil, cassia-lignea and cassia oil, cuttlefish, and hides are the chief exports. A large number of the inhabitants are engaged in fishing and fish-curing.

PALACKY, FRANTISEK (FRANCIS), the Bohemian historian, was born in the year 1798, in the village of Hodslavice, in the northeastern corner of Moravia. In 1829 he was appointed public historiographer by the Bohemian states, and made several lengthened tours to consult documents in public libraries at Munich, Berlin, Dresden, Rome, and elsewhere. He then commenced his *History of the Bohemian People*, which has earned him the undying gratitude of his countrymen. Besides this Palacky obtained a prize from the Bohemian Society of Arts for his work entitled *Würdigung der alten böhmischen Geschichtschreiber*. In the year 1840, he published, in conjunction with Schafarik, *Die ältesten Denkmäler der Böhmisches Sprache*. In 1861 he was made a life member of the Austrian senate. He died in 1876.

PALADIN literally means a courtier, a member of a royal household, one connected with a palace. The *palatium* of the Roman emperors on the Palatine Hill supplied a name for all the royal and imperial residences in mediæval Europe, and a corresponding adjective and noun for royal officials and dependants. From being applied to the famous twelve peers of Charlemagne, the word paladin became a general term in romance for knights of great prowess.

PALÆICHTHYES. See **ICHTHYOLOGY**.

PALÆOLOGUS, a Byzantine family name which first appears in history about the middle of the eleventh century, when George Palæologus is mentioned among the prominent supporters of Nicephorus Botaniats, and afterward as having helped to raise Alexius I. Comnenus to the throne in 1081; he is also noted for his brave defense of Durazzo against the Normans in that year. Michael Palæologus, probably his son, was sent by Manuel II. Comnenus into Italy as ambassador to the court of Frederick I. in 1154; in the following year he took part in the campaign against William of Sicily, and died at Bari in 1155. A son or brother of Michael, named George, received from the emperor Manuel the title of *Sebastos*, and was intrusted with several important missions; it is uncertain whether he ought to be identified with the George Palæologus who took part in the conspiracy which dethroned Isaac Angelus in favor of Alexius Angelus in 1195. Andronicus Palæologus Comnenus was Great Domestic under Theodore Lascaris and John Vatatzes; his eldest son by Irene Palæogina, **MICHAEL** (*q.v.*), became the eighth emperor of that name in 1260, and was in turn followed by his son Andronicus II. (1282-1328). Michael, the son of Andronicus, and associated with him in the empire, died in 1320, but left a son, Andronicus III., who reigned from 1328 to 1341; John VI. (1355-1391), Manuel II. (1391-1425), and John VII. (1425-1448) then followed in lineal succession; Constantine XIII., the last emperor of Constantinople (1448-1453), was the younger brother of John VII. Other brothers were Demetrius, prince of Morea until 1460, and Thomas, prince of Achaia, who died in Rome in 1465. A daughter of Thomas, Zoe by name, married Ivan III. of Russia. A younger branch of the Palæologi held the principality of Monferrat from 1305 to 1533, when it became extinct.

PALÆPHATUS, the author of a treatise *On Incredible (Narratives)*, which has been preserved. It consists of a series of explanations of Greek legends, without any attempt at arrangement or plan. The great number of MSS., containing numerous variations in text, and the frequent quotations made from the treatise by late writers, show that it was a favorite work in their time.

PALAFIX Y MELZI, JOSÉ DE, duke of Saragossa, youngest son of an old Aragonese family, was born in 1780. Brought up at the Spanish court, he

entered the guards at an early age, and in 1808 he accompanied Ferdinand to Bayonne, but made his escape after the king's abdication. While he was living in retirement at his family seat near Saragossa, the inhabitants proclaimed him governor of that city and captain-general of the kingdom of Aragon on May 25, 1808, an honor which he owed to his rank, and, it is said, to his appearance, rather than to talent or experience in military affairs. Despite the want of money and of regular troops, he lost no time in declaring war against the French, who had already overrun the neighboring provinces of Catalonia and Navarre, and soon afterward the attack he had provoked began; Saragossa was bombarded on July 22d, and on August 4th the French were masters of nearly the half of the town. Summoned to surrender, Palafox sent the famous reply of "War to the Knife," and on the following day his brother succeeded in forcing a passage into the city with 3,000 troops. After his surrender Palafox was sent into France and closely confined at Vincennes, but was liberated on the restoration of Ferdinand. In June, 1814, he was confirmed in the office of captain-general of Aragon, but soon afterward withdrew from it. He received the title of duke of Saragossa in 1814, and died at Madrid on February 15, 1847.

PALAMAS. See **HESYCHASTIS**.

PÁLANPUR, a native state in Guzerat, Bombay, India, with an area of 3,510 square miles, and a population of 234,402. The country is mountainous, with much forest toward the north, but undulating and open in the south and east. The principal rivers are the Saraswati and Banás. The chief, an Afghán of the Loháni tribe, enjoys an estimated gross revenue of \$200,000, and pays a tribute to the gáekwár of Baroda. Pálanpur town, the capital of the state, contained a population, in 1889, of 17,547.

PALATINATE, **THE** (German, *Pfalz*), included for some time (from the middle of the seventeenth to the latter part of the eighteenth century) two distinct German districts, the Upper or Bavarian Palatinate, and the Lower Palatinate or the Palatinate on the Rhine. The Upper Palatinate, a duchy, belonged to the Nordgau and Bavarian circle, and was bounded by Baireuth, Bohemia, Neuburg, Bavaria, and the territory of Nuremberg. In 1807 (with Cham and Sulzbach) it had 283,800 inhabitants. The Lower Palatinate belonged to the electoral Rhenish circle, and was bounded by Mainz, Katzenellenbogen, Würtemberg, Baden, Alsace, Lorraine, and Treves. It took in the Electoral Palatinate (with a population, in 1786, of 305,000), the principality of Simmern, the duchy of Zweibrücken, half of the county of Sponheim, and the principalities of Veldenz and Lautern.

The palsgaves of the Rhine originally had their seat in Aix-la-Chapelle. In the eleventh century the country called the Palatinate belonged to them as an hereditary fief, in virtue of which they rank among the foremost princes of the empire. In 1156, after the death of Palsgrave Hermann III. without heirs, the Palatinate was granted by the emperor Frederick I. to his stepbrother Duke Conrad of Swabia. And so under this succession it passed into other hands. The house of Bavaria retained the Upper Palatinate, with the office of arch-sewer, and with the rank which had formerly been held in the electoral college by the counts palatine; but it was arranged that, if the male line of Bavaria died out, the lands and rights which had belonged to the rulers of the whole Palatinate should be restored to their descendants. Philip William, of the Neuburg line, died in 1690, and was succeeded by his son John William, who in 1694 inherited Veldenz, and during the war of the Spanish succession received the Upper

Palatinate and all the ancient rights of his house. At the conclusion of the war, however, both rights and lands were restored to the elector of Bavaria. In 1716 John William was succeeded by his brother Charles Philip, and with Charles Philip, who died in 1642, the Neuburg line came to an end, and the Lower Palatinate was inherited by Charles Theodore, of the Sulzbach line. In 1777 the male line of Bavaria became extinct by the death of the elector Maximilian Joseph, and then, in accordance with the treaty of Westphalia, the Upper Palatinate and the Lower Palatinate were reunited, and the palgrave resumed the office of arch-sewer and the ancient place of his family in the electoral college, while the office of lord high treasurer was transferred to the elector of Brunswick. By the treaties of Paris concluded in 1814 and in 1815, the palatine lands on the left bank of the Rhine were restored to Germany, the larger part of them being granted to Bavaria, and the rest to Hesse-Darmstadt and Prussia. The Prussian part of the Palatinate is in the Rhine province; the Hesse-Darmstadt part is included in the province of Starkenburg and Rhine Hesse; the Bavarian part is known as Rhenish Bavaria; and the Baden part is in the Lower Rhine district, which, in 1865, was divided into the districts of Mannheim, Heidelberg, and Mosbach.

PALAWAN. See PHILIPPINE ISLANDS.

PALAZZOLO (often *P.-Acreide* to distinguish it from several other places of the same name), a city of Italy, in the province of Syracuse, Sicily, with a population of 13,069 according to the census of 1889.

PALEARIO, AONIO, Italian humanist and reformer, was born about 1500, at Veroli, in the Roman Campagna. Other forms of his name are Antonio Della Paglia, A. Degli Pagliaricci. In 1536 his didactic poem in Latin hexameters, *De Immortalitate Animarum*, was published at Lyons. In 1542 an Italian tract written by him and entitled *Della Pienezza, Sufficienza, et Satisfazione della Passione di Christo*, or *Libellus de Morte Christi*, was made by the Inquisition the basis of a charge of heresy, from which, however, he successfully defended himself. In 1546 he accepted a professorial chair at Lucca, which he exchanged in 1555 for that of Greek and Latin literature at Milan. Here about 1566 his enemies renewed their activity, and in 1567 he was formally accused of having taught the doctrine of justification by faith alone, denied that of purgatory, spoken slightly of monastic institutions, and so on. Removed to Rome to answer these charges, he was detained in prison until sentence of death was carried out in July, 1570.

PALEMBANG. See SUMATRA.

PALENCIA, an inland province of Spain, one of the eight in which Old Castile is divided, and has an area of 3,127 square miles. In shape it is an irregular parallelogram. The general direction of all its larger streams is from north to south; of these the principal are the Pisuega and the Carrion, which unite at Dueñas and flow into the Douro in Valladolid. The northern part of the province, including the whole partido of Cervera, is mountainous, with some wood and with good pasture in the valleys; the remainder, the "Tierra de Campos," belongs to the great Castilian table-land, and is in general level and almost wholly devoid of trees. In the south occurs a considerable marsh or lake known as La Laguna de la Nava, as yet only partially drained. The mountainous district abounds in minerals, but only the coal is worked, the principal mines being those of San Feliceo de Castilleria, Orbo, and Villaverde de la Peña. The province is essentially agricultural, wheat and other cereals, legumes, hemp, and flax being everywhere extensively grown, except in the mountainous districts. Other

industries are of secondary importance, the principal being flour-milling and the manufacture of linen and woolen stuffs. The province is divided into seven partidos—Astudillo, Baltanas, Carrion, Frechilla, Palencia, Saldaña, and Cervera; the total population, in 1889, was 180,785. The only ayuntamiento with a population exceeding 10,000 was that of Palencia.

PALENCIA, capital of the above province, occupies a level site on the left bank of the river Carrion, here crossed by a good stone bridge and by another called Los Puenteccillos. Palencia is the junction of the lines from Asturias and Galicia, and is seven miles from Venta de Baños on the Madrid and Irun railway. The distances north-northeast from Valladolid and southeast from Leon are twenty-three and eighty-two miles respectively. The leading industries of Palencia are the woolen and linen manufactories, in which a third of the inhabitants are engaged; flour-milling comes next in importance. The population of the ayuntamiento was 14,505 in 1889.

PALENQUE, RUINS OF, in Chicapas, Mexico. See ARCHITECTURE.

PALEOGRAPHY. Paleography is the study of ancient handwriting from surviving examples. It takes cognizance of writings of a literary, economical, or legal nature, written generally with stile, reed, or pen, on tablets, rolls, or books. Metals, such as gold, bronze, lead, and tin, have been used in paleography; leaden plates, for example, in addition to those which have been found buried with the dead and bearing inscriptions of various kinds, were also used in the Venetian States down to the fourteenth or fifteenth century as a material on which to inscribe historical and diplomatic records. The ancient Assyrians recorded their history on sun-dried or fire-burnt bricks, and inscribed potsherds or *ostraka* have been gathered in hundreds in the sands of Egypt. Among the Romans ivory was sometimes substituted for wood in the waxen tablets. The employment of PAPYRUS (*q.v.*) as an ordinary writing material in ancient Egypt is well known. The most ancient examples of Greek writing are those which are found in the papyrus rolls of Egypt of the second century B.C. This material continued to be used by Greek scribes down to the ninth century. Dating from the fifth to the tenth century are the papyrus deeds of Ravenna; and papal documents on the same substance extend from the eighth to the eleventh century. Papyrus was also used for documents in France under the Merovingian kings. It was also made up into books for the reception of literary works, in which form it was sometimes strengthened by the addition of vellum leaves which incased the quires, and it was probably used thus in Italy and France down to the tenth century. Instances of the use of leather in Western Asia are recorded by ancient writers. The Jews still inscribe the law upon leathern rolls.

By common consent the name of parchment has in modern times given place to that of vellum, a term properly applicable only to calfskin, but now generally used to describe a mediæval skin book of any kind. Parchment is a title now usually reserved for the hard sheepskin or other skin material on which law deeds are engrossed.

Purple-stained vellum was used by the Romans for wrappers for their papyrus rolls. In the third century it is recorded that entire volumes were made of this ornamental substance and written in gold or silver. Examples of such costly MSS. of the sixth century have survived to the present day, as the Codex Argenteus of the Gothic Gospels at Upsala, the fragments of the illustrated Genesis at Vienna, the leaves of the purple Gospels in the Cottonian Library and elsewhere, the

Codex Rossanensis, lately discovered, and some others. Some richly-stained leaves of the eighth century remain in the Canterbury Gospels in the British Museum. On the Continent the great impetus given to the production of splendid MSS. under the rule of Charlemagne revived the art of staining; and several fine examples of it exist in MSS. of the eighth, ninth, and tenth centuries. At a later period, when the art was forgotten, the surface only of the vellum was painted in imitation of the older staining which soaked into the substance of the skin. Other colors besides purple were sometimes employed, particularly in the period of the Renaissance, to paint or stain vellum; but MSS. so treated are rather to be regarded as curiosities produced by the caprice of the moment.

Cotton paper is said to have been known to the Chinese at a remote period, and to have passed into use among the Arabs early in the eighth century. It was imported into Constantinople, and was used for Greek MSS. in the thirteenth century. In Italy and the West it never made much way. Rag paper came into general use in Europe in the fourteenth century, and gradually displaced vellum. In the fifteenth century MSS. of vellum and paper mixed were common. (See PAPER.)

The book form was adopted from the waxen tablets, and the name *caudex* or *codex* was also taken over. It has been inferred, from the terms in which Martial speaks of vellum books, that they were articles of luxury at Rome; and, although no examples have survived from classical times, and none were found in the ruins of Herculaneum, the sumptuousness of the earliest extant volumes supports this view. The shape in which they are made up during the early centuries of the Middle Ages is the broad quarto.

The quires or gatherings of which the book was formed generally consisted, in the earliest examples, of four sheets folded to make eight leaves, although occasionally quinterns, or quires of five sheets (ten leaves), were adopted. Sexterns, or quires of six sheets (twelve leaves), came into use at a later period. The quire-mark, or "signature," was usually written at the foot of the last page, but in some early instances (*e.g.*, the *Codex Alexandrinus*) it appears at the head of the first page. The numbering of the separate leaves in a quire, in the fashion followed by early printers, came in in the fourteenth century. Direction-words to connect the quires date back to the twelfth century.

No exact system was followed in ruling the lines and in arranging the sheets when ruled. In the case of papyri it was enough to mark with the pencil the vertical marginal lines to bound the text; the grain of the papyrus was a sufficient guide for the lines of writing. With the firmer material of vellum it became necessary to rule lines to keep the writing even. These lines were at first drawn with a hard point, almost invariably on the hair (or outer) side of the skin, and strongly enough to be in relief on the flesh (or inner) side. Marginal lines were drawn to bound the text laterally; but the ruled lines which guided the writing were not infrequently drawn right across the sheet. Each sheet should be ruled separately; but two or more sheets were often laid and ruled together, the lines being drawn with so much force that the lower sheets also received the impressions. In rare instances lines are found ruled on both sides of the leaf, as in some parts of the *Codex Alexandrinus*. In this same MS. and in other early codices the ruling was not always drawn for every line of writing, but was occasionally spaced so that the writing ran between the ruled lines as well as on them. In making up the quires, care was generally taken to lay the sheets in such a way that hair-side faced hair-side, and flesh-side faced flesh-side; so that, when the

book was opened, the two pages before the reader had the same appearance, either the yellow tinge of the hair-side, or the fresh whiteness of the flesh-side. In Greek MSS. the arrangement of the sheets was afterward reduced to a system: the first sheet was laid with the flesh-side downward, so that that side began the quire; yet in so early an example as the *Codex Alexandrinus* the first page of a quire is the hair-side. In Latin MSS. also the hair-side appears generally to have formed the first page. Ruling with the plummet or lead-point came into ordinary use in the twelfth century; red and violet inks were used for ornamental ruling in the fifteenth century. The lines were evenly spaced by means of prickings in the margins; in some early MSS. these prickings run down the middle of the page.

Inks of various colors were employed from early times. Red is found in initial lines, titles, and colophons in the earliest vellum MSS. For purposes of contrast it was also used in glosses, as in the Lindisfarne Gospels and in the Durham Ritual. In the Carlovingian period entire volumes were occasionally written with this ink. Other colored inks—green, violet, and yellow—are also found at an early date. Writing in gold and silver was inscribed on purple vellum in ancient MSS., as has been noted above; under Charlemagne it again came into fashion. Gold was then applied to the writing of ordinary vellum MSS. It was also introduced into English MSS. in the tenth century.

With regard to writing implements, it will be here enough to note that for writing on waxen tablets the pointed *stilus* or *graphium* was used; that the reed (*calamus* or *canna*) was adapted for both papyrus and vellum, and that in Italy at least it appears to have been used as late as the fifteenth century; and that the quill pen can be traced back to the sixth century of our era.

The period of Greek paleography begins with the second century B.C., and ends at the close of the fifteenth century. Greek writing in MSS. passed through two courses—that of the uncial or large letter, and that of the minuscule or small letter. The period of the uncial runs from the date of the earliest specimens on papyrus of the ninth century, that of the minuscule from the ninth century to the invention of printing. Uncial Greek writing in early times is found in two forms—the set and the cursive. The earliest examples of both have been discovered in Egypt and in the ruins of Herculaneum. With regard to the different dates to be assigned to the early relics, those which have been recovered from Herculaneum have a limit, after which they cannot have been written, in the year of the destruction of the city, 79 A.D.

The oldest form of book writing which we find employed in Latin MSS. is in capitals, and of these there are two kinds—the square and the rustic. Square capitals may be defined as those which have their horizontal lines at right angles with the vertical strokes; rustic letters are not less accurately formed, nor are they rough in character, but being without the exact finish of the square letters, and being more readily written, they have the appearance of greater simplicity.

Roman writing, capital, uncial, half uncial, and cursive, became known to the Western nations, and in different ways played the principal part in the formation of the national styles of writing. In Ireland and England it was adopted under certain restrictions. On the Continent it had a wider range, and from it were constructed the three kinds of writing which in many characteristics closely resembled one another, and which, practiced in Italy, Spain and Frankland, are known by the names of Lombardic, Visigothic, and Merovingian. The basis of all three was the Roman cursive.

PALEONTOLOGY. See GEOLOGY.

PALEOTHERIUM. See MAMMALIA.

PALERMO (Latin, *Panhormus*, *Panormus*), the capital of the Sicilian kingdom as long as it kept its separate being, now capital of a province of the same name in the kingdom of Italy, and the see of an archbishop. The population numbered 205,712 in 1889. The city stands in the northwest part of the island, on a small bay looking eastward, the coast forming the chord of a semicircle of mountains which hem in the *campagna* of Palermo, called the Golden Shell (Conca d'Oro). The most striking point is the mountain of Heirkte, now called Pellegrino (from the grotto of Santa Rosalia, a favorite place of pilgrimage), which rises immediately above both the sea and the city.

Like the other Phœnician colonies in the west, Panhormus came under the power of Carthage, and became the head of the Carthaginian dominion in Sicily. As such it became the center of that strife between Europe and Africa, between Aryan and Semitic man, in its later stages between Christendom and Islam, which forms the great interest of Sicilian history. As the Semitic head of Sicily, it stands opposed to Syracuse, the Greek head. Under the Carthaginian it was the head of the Semitic part of Sicily; when, under the Saracen, all Sicily came under Semitic rule, it was the chief seat of that rule. It has been thrice won for Europe by Greek, Roman, and Norman conquerors—in 276 B.C. by the Epirot king Pyrrhus, in 254 B.C. by the Roman consuls Aulus Atilius and Gnaeus Cornelius Scipio, and in 1071 A.D. by Robert Guiscard and his brother Roger, the first count of Sicily. After the conquest by Pyrrhus, the city was soon recovered by Carthage, but this first Greek occupation was the beginning of a connection with western Greece and its islands which was revived under various forms in later times. After the Roman conquest an attempt to recover the city for Carthage was made in 250 B.C., which led only to the great victory of Metellus just under the southern wall of the city. Later in the First Punic War Hamilcar Barca was encamped for three years on Heirkte or Pellegrino, but the Roman possession of the city was not disturbed. Panhormus remained a Roman possession, and one of the privileged cities of Sicily, till it was taken by the Vandal Genseric in 440 A.D. It afterward became a part of the East-Gothic dominion, and was recovered for the empire by Belisarius in 535. It again remained a Roman possession for exactly three hundred years, till it was taken by the Saracens in 835. As Syracuse remained to the empire for a much longer time, Panhormus now became the Mussulman capital. In 1063 the Pisan fleet broke through the chain of the harbor and carried off much spoil, which was spent on the building of the great church of Pisa. After the Norman conquest the city remained for a short time in the hands of the dukes of Apulia. But in 1093 half the city was ceded to Count Roger, and in 1122 the rest was ceded to the second Roger. When he took the kingly title in 1130, it became and remained the capital and crowning-place of the kingdom.

During the Norman reigns Palermo was the main center of Sicilian history, especially during the disturbances in the reign of William the Bad (1154-66). The emperor Henry VI. entered Palermo in 1194, and it was the chief scene of his cruelties. In 1198 his son Frederick, afterward emperor, was crowned there. His reign was the most brilliant time in the history of the city. After his death Palermo was for a moment a commonwealth. It passed under the dominion of Charles of Anjou in 1266, but he was never crowned there. In the next year, when the greater part of Sicily revolted on behalf of Conradin, Palermo was one of the few towns which were held for Charles; but the

famous Vespers of 1282 put an end to the Angevin dominion. From that time Palermo shared in the many changes of the Sicilian kingdom. In 1535 Charles V. landed there on his return from Tunis. The last kings crowned at Palermo were Victor Amadeus of Savoy in 1713, and Charles III. of Bourbon in 1735. The loss of Naples by the Bourbons in 1798, and again in 1806, made Palermo once more the seat of a separate Sicilian kingdom. The city rose against Bourbon rule in 1820 and in 1848. In 1860 came the final deliverance at the hands of Garibaldi, but with it came also the yet fuller loss of the position of Palermo as the capital of a kingdom of Sicily.

The original city was built on a tongue of land between two inlets of the sea. There is some question as to their extent inland, and as to the extent of salt and fresh water. But there is no doubt that the present main street, the Cassaro, Via Marmorea, or Via Toledo (in official language Via Vittorio Emanuele), represents the line of the ancient town with water on each side of it. Another peninsula with one side to the open sea, meeting as it were the main city at right angles, formed in Polybius' time the *Neapolis* or new town, in Saracen times Khalesa, a name which still survives in that of Calsa. It was on this side that both the Romans and the Norman conquerors entered the city. But the old relations of land and water have long been changed. The two ancient harbors have been dried up; the two peninsulas have met; the long street has been extended to the present coast-line; a small inlet called the Cala alone represents the old haven. The city kept its ancient shape till after the time of the Norman kings. It is still easy to mark the site of the two inlets, which now form valleys on each side of the long street.

PALES, an old Italian deity, worshiped in the festival of the *Palilia* at Rome on April 21st. In this festival Pales was invoked to grant protection and increase the flocks and herds; the worshipers entreated forgiveness for any unintentional profanation of holy places of which they might have been guilty, and sprang through fires of straw as a purificatory rite.

PALESTINE, geographically considered, forms the southernmost third of SYRIA. By Palestine is to be understood in general the country seized and mainly occupied by the Hebrew people. That portion of territory is consequently excluded which they held only for a time, or according to an ideal demarkation by which the land of the Israelites was made to extend from the "river of Egypt" to Hamath; but on the other hand, that other ancient tradition is accepted which fixes the extreme borders at Dan (at the foot of Hermon) in the north and at Beersheba in the south, thus excluding the Lebanon district and a portion of the southern desert. In like manner, though with certain limitations to be afterward mentioned, the country east of Jordan stretched from the foot of Hermon to the neighborhood of the Arnon. Toward the west the natural boundary—a purely ideal one so far as occupation by the Israelites was concerned—was the Mediterranean, but toward the east it is difficult to fix on any physical feature more definite than the beginning of the true steppe region. As the country west of the Jordan stretches east as far as 35° 35' it has a breadth in the north of about twenty-three miles and in the south of about eighty miles. Its length may be put down as 150 miles; and, according to the English engineers, whose survey included Beersheba, it has an area of 6,040 square miles. For the country east of the Jordan no such precise figures are available, both sections aggregating about 10,000 square miles.

The country west of Jordan is a hilly and mountainous region which, forming as it were a southward



Scale of Statute Miles

Longitude East from Greenwich.

continuation of Lebanon, slopes unsymmetrically east and west, and stretches south, partly as a plateau, beyond the limits of Palestine. The mountain range consists of a great number of individual ridges and summits, from which valleys, often rapidly growing deeper, run east and west. Toward the Mediterranean the slope is very gradual, especially in the more southern parts, where the plain along the coast is also at its broadest. About three-fourths of the cis-Jordan country lies to the west of the watershed. Toward the Dead Sea, on the other hand, the mountains end in steep cliffs; and, as the Jordan valley deepens, the country draining toward it sinks more abruptly, and becomes more and more inhospitable. The plateaus back from the coast-cliffs of the Dead Sea have been desert from ancient times, and toward the east they form gullies of appalling depth. On the other side of the Jordan the mountains have quite a different character, rising from the river gorge almost everywhere as a steep wall (steepest toward the south), which forms the edge of the great upland stretching east to the Euphrates.

Palestine is not exceptionally deficient in water. Perennial streams, indeed, are scarce in Palestine, and were so in antiquity; but except in certain districts, as the desert of Judah, the country is not badly supplied with springs. A considerable number of hot springs occur throughout the country, especially in and near the Jordan valley; they were used in ancient times for curative purposes, and might still be so used. Hot sulphur springs also occur on the west coast of the Dead Sea. Many of the springs in Palestine are slightly brackish. From the earliest times cisterns have naturally played a great part in the country; they are found everywhere in great numbers. Open reservoirs were also constructed to collect rain and spring water.

Palestine may be considered part of the subtropical zone. The mean annual temperature of the lowlands is 70° Fahr., the extremes being 50° and 85°. Citrons and oranges flourish; the palm also grows, but without fruiting; melons are largely cultivated; and pomegranate bushes are to be seen. The average temperature of Jerusalem, which may be taken as pretty much that of the upland as a whole, is 62°, but the extremes are considerable, as the thermometer may sink several degrees below the freezing point, though frost and snow never last long. The rainfall of twenty inches is distributed over about fifty days. In this climate the vine, the fig, and the olive succeed admirably.

While the rainfall in the Jordan valley is very slight, the precipitation in the eastern mountains is again considerable; as in western Palestine the dewfall is heavy. From this short survey it appears that Palestine is a country of strong contrasts. Like all the lands of the nearer East, Palestine suffers from the decay of the branches of industry which still flourished there in the Middle Ages. The harbors are not of sufficient size for large vessels; that of Haifa alone is capable of any development. The road from Yafa to Jerusalem is the only one in the country fit for carriages. The proposal to construct a railway along this route (for which a firm was granted in 1875) is renewed from time to time; but it will be hard to carry it out. At the same time the formation of means of communication would increase the productiveness of the country. As regards the industrial arts, souvenirs for the pilgrims, rosaries, carved work in olive wood and mother-of-pearl, etc., are produced at Jerusalem and Bethlehem, and to some extent are exported. Wheat from the Hauran is also shipped at Acre and elsewhere, but neither exports nor imports are commercially important. The salt farming, which could easily be carried on at the Dead Sea and the deposit of salt to the south of it, is hampered by

the difficulty of bringing the produce up the steep paths to the top of the mountains. In the valley of the Jordan all the products of the tropics could with little trouble be cultivated. Bee-keeping still receives attention, but might also be extended.

Evidence of an early occupation of Palestine is afforded by the stone monuments (cromlechs and circles of stones), which are found more especially in the country east of Jordan, but also in the country to the west. Stories of a gigantic primeval population once prevailed in Palestine. To what race these people may have belonged is, however, unknown. For thousands of years Palestine was an object of conflict between the vast monarchies of western Asia. For both Egypt and the East indeed the country formed a natural thoroughfare, in the time of war for the forces of the contending powers, in the time of peace for the trading caravans which carried on the interchange of African and Asiatic merchandise.

The information supplied by the Old Testament enables us to form only an extremely imperfect conception of the earliest ethnographic condition of the country. The population to the east of the Jordan was already, it is clear, sharply marked off from that to the west. In the latter region dwelt an agricultural people which had already reached no inconsiderable degree of civilization. Closely related to the Phoenicians, they were distinguished as Canaanites from the name of their country, which originally applied to the maritime belt and afterward to the whole cis-Jordan territory. The Amorites were the most powerful tribe; they dwelt in the southern portion of Canaan, as well as more especially in the northern parts of the country east of Jordan. About the others nothing more can be said save that the Perizzites, Hivites, and Girgashites dwelt in the heart of Canaan, and the Jebusites, near Jerusalem. The Philistines occupied the southwest of the country; an Arabian population was settled in the south and southwest. Amalekites and Midianites, and the Kenites, a branch of the latter, early entered into close relationship with the Israelites, and along with them took possession of the extreme south, where, however, they remained nomadic. Of peoples closely akin to the Israelites may be mentioned the Moabites, the Ammonites, and the Edomites.

It depends on the conception we form as to the general tribal relations of Israel how we represent to ourselves the method in which the settlement of the country by the tribes was accomplished as they passed from the nomadic to the fixed mode of life. To explain this tribal relationship is not the task of a geographical sketch; it is enough for the present purpose to call attention to the fact that the account of the rise of the Israelitic tribes as it has come down to us is in great measure mythical or the product of later reflection; even the number twelve is made out only with difficulty. Further, the settlements of the several tribes must be by no means conceived as administrative districts after the fashion of the modern canton; and, thirdly, the view that the several tribes had, after a general invasion of the country, their tribal territories allotted by Joshua (as we now read in the book of Joshua) is taken from the most modern, post-exilic, source of the Hexateuch, and stands in glaring opposition to the accounts in other books, according to which the conquest was in the main a peaceful one, and the assimilation with the native Canaanites gradually effected. The tribes which settled to the north of the great plain, especially those on the seacoast, appear to have been much less successful in keeping free from Canaanitish influence; gradually however, as the state and religion of Israel grew stronger, Israelitish influence

made its way more and more even there. The heart of the country was the central portion later known as Samaria. The opposition between this district and the southern part of the country took shape at a later date. In the extreme south the Simeonites retained their nomadic way of life, and were by degrees mixed up with other wandering tribes. Down into the time of the early kings the dominion of the powerful Philistines stretched far into the center of the country, and gave the first impulse to a firmer concentration of the energies of Israel. But the Israelites did not succeed in forcing their way in the southern regions down to the sea; in culture and well-established political institutions they were far surpassed by the Philistines.

In regard to the south country in general, we obtain in the Old Testament the most detailed description of the frontiers, but the reason that we are able to follow it with so much accuracy is that the statements refer exclusively to post-exilic times, though it must be assumed that a certain recollection was still preserved of the original boundary between Judah and Benjamin. The task is rendered much easier by the fact that in Palestine, as in every country where the ethnographic conditions have not been too violently revolutionized, a large number of ancient names of places have been preserved in use for thousands of years, often with only insignificant changes of form—a state of matters to which the continuous existence in the country of Semitic-speaking people has powerfully contributed. The identification of the ancient with the modern names demands none the less thorough historical and philological investigation.

The tribes of Israel made a great step in the conquest of the country when, under the early kings, they became subject to a single central government. They were now strong enough to seize many of the walled towns which the Canaanites had hitherto occupied; and their dominion, indeed, extended far beyond the limits of Palestine. Our information in regard to the divisions of the country during the regal period is very defective.

Gilead was the center of the power of the Israelites on the east side of Jordan, and the whole country which they possessed there bore this name. Gilead consequently is opposed to Canaan, the "Promised Land," for the later Hebrews distinguished this western territory as more especially the country which had been promised them, and regarded it as the possession of their national God, and therefore as a holy land. After the separation the more important northern and eastern portion naturally became the land of Israel *par excellence*, while the southern portion ultimately received the name of the individual tribe of Judah (as indeed the northern kingdom was frequently called after the most powerful tribe of Ephraim). The name of the southern kingdom appears in Cuneiform inscriptions as *mât (îr) Ya-u-du (di)*; and it is said that *mât Sir'lai* occurs once for the land of Israel, though more frequently it is called *mât Humrî* (Land of Omri). Though it has not been absolutely proved that even the Assyrians occasionally included Judah under the designation *Palastav* or *Pilista* (Philistia), still there is nothing improbable about the supposition.

Palestine is by no means so strikingly a country apart as is usually supposed. It lay, as already mentioned, near the military great highway from western Asia to Egypt and Africa. The traffic by sea was also formerly of importance; and even in the Middle Ages something was done for the protection of the harbors. At no time, however, was the country in the proper sense of the word a rich one; it hardly ever produced more than was necessary for home consumption. The great trading

caravans which passed through were glad for the most part to avoid the highlands, and that region at least was thus more or less isolated.

There are no trustworthy estimates of the number of inhabitants in the country at any period of its history. Certain districts, such as Galilee, have, there is no doubt, from early times been much more populous than certain other districts; the desert of Judah and some portions of the country east of Jordan must all along have been very sparsely settled. The figures given in the book of Numbers indicate that the whole country contained about 2,500,000 souls—it being assumed that the statistics do not refer to the time of the wandering in the wilderness, and that the details may be suspected of being artificially adjusted. The number 2,500,000 to 3,000,000 may indeed be taken as a maximum; the population can hardly ever have been more than four times its present strength, which is estimated at 650,000 souls.

PALESTINE, a post-town, capital of Anderson county Tex., on the International and Great Western railroad, 152 miles north of Houston, 84 miles south-southwest of Longview, and 91 miles northeast of Herne. It is the northeast terminus of a branch railroad which extends 180 miles to Austin. It contains a courthouse, six churches, a high school, a bank, and a manufactory of brass and iron. The press is represented by one daily and two weekly newspapers. Population, in 1890, 5,384.

PALESTRINA, GIOVANNI PIERLUIGI DA, distinguished by the honorable title of *Princeps Musicæ*, was born about 1524, at Palestrina, whence his name. He did much to change the style of music from the pedantic, and to foster the beautiful rather than its mathematical tendency. He studied at Rome, and in 1554 he published his *First Book of Masses*. In the following year he was enrolled by command of Pope Julius III. among the singers of the Cappella Sistina. Subsequently he was given important offices. He died in 1594.

PALEY, WILLIAM, was born in 1743 at Peterborough, England. In 1759 he proceeded to Cambridge, and after taking his degree, in 1763, he was for about three years assistant in a school in Greenwich. In 1782 he became archdeacon of Carlisle. His first important work, *The Principles of Moral and Political Philosophy*, was published (as *Principles of Morality and Politics*) in 1785. It was followed, in 1790, by his first essay in the field of Christian apologetics, *Horæ Paulinæ, or the Truth of the Scripture History of St. Paul, evinced by a Comparison of the Epistles, which bear his name, with the Acts of the Apostles and with one another*. In 1794 this work was followed by a more important one in the same field, the celebrated *View of the Evidences of Christianity*. His last and most remarkable work was *Natural Theology, or Evidences of the Existence and Attributes of the Deity, collected from the appearances of nature*. He died May 25, 1805.

PÂLGHÂT, a town in Malabar district, Madras, India, situated in the gap or pass of the same name in the Western Ghâts, seventy-four miles southeast of Beypur, with a population, in 1889, of 40,339. Being the key to Travancore and Malabar from the east, it was formerly of considerable strategic importance. The fort fell for the first time into British hands in 1768, and subsequently formed the basis of many of the operations against Tippoo, which terminated in the storming of Seringapatam. It still stands, but is no longer garrisoned.

PALGRAVE, SIR FRANCIS, historian, was born in London, July, 1788, and died at Hampstead, July, 1861.

PÂLI (pronounced *Bali* by the Siamese) is the name of the literary language of the Buddhists in Ceylon,

Burmah, Siam, and Cambodia. Laloubère is the first European writer who mentions the name, toward the end of the seventeenth century. When and where that language was formed is still a matter of controversy. Pâli has aptly been said to stand phonetically in the same position to Sanskrit as Italian does to Latin. There is the same tendency to smooth down all sounds difficult of utterance, to assimilate or otherwise simplify compound consonants, and to substitute vocalic or nasal for consonantal word-terminations.

The study of Pâli by Europeans is of comparatively recent date; in fact, our knowledge of the very existence of an extensive Pâli literature dates only half a century back.

While in Siam and Ceylon the law books are in the vernacular, they are in Burmah in the original Pâli, generally accompanied by a Burmese gloss.

PALIMPSEST, a term applied to any material from which writing has been removed to make room for another text, and which has thus been prepared or scraped a second time (*παλίμψηστος*). Such an object, therefore, as an inscribed monumental stone or brass may be made palimpsest. But the term is most commonly applied to ancient MSS. which have undergone this treatment.

PALINDROME (*πάλιν*, again, and *δρόμος*, a course), a verse or sentence which runs the same when read either backward or forward. Such is the verse:

Roma tibi subito motibus ibit amor;

or

Signa te, signa, temere me tangis et angis.

Some have refined upon the palindrome, and composed verses each word of which is the same read backward as forward—for instance, that of Camden—

Odo tenet mulum, madidam mappam tenet Anna,
Anna tenet mappam madidam, mulum tenet Odo.

The following is still more complicated, as reading in four ways—upward and downward as well as backward and forward:

S A T O R
A R E P O
T E N E T
O P E R A
R O T A S

PALISSY, BERNARD, was born in 1510 at La Chapelle Biron, a village in the province of Périgord, France. His father was a painter of stained glass, and taught his son the practice of this important craft. Bernard happened to see a fine piece of enameled pottery, probably majolica ware from Italy, and thereupon resolved to spend any time and labor to discover for himself the secret of the beautiful enameled surface that he admired so much in that piece of pottery. His trade as a glass-painter had taught him something of the methods of painting and firing enamel colors, and at the neighboring village of La Chapelle des Pots he learned the rudiments of the potter's art in its simplest form; but this was all the help he had.

Year after year, through a succession of utter failures, and almost without a gleam of hope, he labored on, working often blindly and at random in search for the secret of the white enamel. Almost starving for want of food, his wife in rags bitterly and not unreasonably reproaching him for his cruelty, his furniture broken up to feed his kilns, and, without a hand to help, Palissy struggled on for nearly sixteen years before success came. All those struggles and failures are most vividly told by Palissy himself in one of the most thrilling pieces of autobiography ever written.

For a few years Palissy enjoyed untroubled reward for his years of toil and unflinching constancy of pur-

pose. But before long Palissy became irresistibly enthralled by the new doctrine of the Reformation, and enrolled himself an enthusiastic member of the Huguenot party. He was arrested and imprisoned at Bordeaux, while his kilns and the materials of his trade were destroyed by command of the magistrates.

Through the intervention of the French court Palissy was, after a time, liberated, and worked in comparative peace and prosperity till 1588, when a fresh outburst of religious zeal against the Huguenots proved too strong even for the royal patronage, which for so long had sheltered him. He was thrown into the Bastille, and, though Henry III., who was then king, offered him rewards and freedom if he would recant, Palissy preferred death to falsehood, and was condemned to death, but died shortly after in one of the dungeons of the Bastille, in the year 1589.

PĀLITĀNA, a "second-class" native state of India, in KĀTHIĀWĀR (*q.v.*), Bombay presidency, with an area of 305 square miles, and a population (1881) of 49,271. The chief pays a tribute jointly to the gāekwār of Baroda and the nawāb of Junagarh. The capital of the state is Pālitāna (population, 7,659).

PALLADIO, ANDREA, a native of Vicenza, in the north of Italy, one of the chief architects of his century. He was born in 1518 and died in 1580.

PALLADIUM, an archaic wooden image of Pallas, preserved in the citadel of Troy as a pledge of the safety of the city. It represented the goddess, standing in the stiff archaic style, holding the spear in her right hand. According to one story, Zeus had thrown it down from heaven when Ilus was founding the city of Ilium. Odysseus and Diomedes carried it off from the temple of Pallas, and thus made the capture of Troy possible.

PALLADIUS, RUTILIUS TAURUS ÆMILIANUS, a writer of the fourth century after Christ, author of a poem on agriculture (*De Re Rustica*) in fourteen books. The material is derived from Columella and other earlier writers. The work was popular in the Middle Ages.

PAL LAHĀRA, a tributary state of ORISSA, (*q.v.*)

PALLAS. See ATHENA.

PALLAS, PETER SIMON, naturalist and traveler, was born in Berlin, September 22, 1741. He died September 8, 1811.

PALLAVICINO, FERRANTE, a writer of pasquinades, was born at Piacenza in 1618. He published a number of clever but exceedingly scurrilous satires on the Roman curia and on the powerful house of the Barberini, which were so keenly resented at Rome that a price was set on his head. A Frenchman betrayed him into his enemies' hands. After fourteen months' imprisonment and some observance of the formalities of a trial he was beheaded at Avignon on March 6, 1644.

PALLAVICINO, or PALLAVICINI, SFORZA, cardinal, representative of another branch of the same family, was born at Rome in 1607. In 1659 he was made a cardinal by Alexander VII. His death occurred in 1667.

PALLISER GUN. This gun (so called from the inventor of the system) consists of a cast-iron outer body bored to a certain caliber, into which have been fitted two or more coiled wrought-iron (or steel) rifled tubes, which form the bore or interior of the piece. The manner of arrangement in guns of the smaller caliber usually is as follows: A tube, the length of the interior of the gun, is constructed by welding together a spiral coil of iron or steel (after the manner of making twist gun-barrels). The breech end of this tube is smaller in its outside circumference than the muzzle end, and over it is shrunk on another coil, or reënforce, the thickness of the two coils at the breech, rendering the tube

of a uniform circumference along its entire length, with the exception of a very slight taper, to which the bore of the cast-iron case is made to conform. This tube, after being inserted in the outer case, is secured by a screw thread at the muzzle of the case, into which threads cut on a collar at the muzzle end of the wrought tube fit; in addition to which screws are inserted just forward of the trunnions of the gun, at right angles to its longer axis, reaching into the metal of the interior tube, but not penetrating into its bore. The unequal expansion of the wrought tube is provided for by compression of its material, which is effected by permanently stretching it by means of heavy proof charges.

This system has been used in the United States, a large number of ten-inch Rodman guns having been converted into eight-inch rifles, the plan meeting with uniform success, and giving to the guns a greater power of penetration, although their muzzle velocity has been diminished; but at the same time their accuracy and range have been increased, and their weight of projectile augmented. These converted guns contain fifteen grooves and bands of uniform width with one complete twist in forty feet length.

In the larger guns Major Palliser proposes to use three or even more tubes of wrought iron accurately fitted one over the other, for the purpose of giving greater strength of resistance, and to prevent the continuity of any interior rent in the bore which may occur.

PALLISER PROJECTILES. These are intended, by reason of their superior hardness, to be used entirely for the purpose of penetrating armor. They are composed of (1) the head, which is cast in a chilled metallic mold, which gives the projectile intense hardness at that end, the length of the head being nearly one-half of the longer axis of the projectile; (2) the body, which is cast in sand and has a hollow chamber; (3) the studs; (4) the screw plug and bushing; (5) the extractor holes. The cavity in the body of the solid shot is intended to prevent the splitting and cracking liable to ensue on the action of the molecular forces of the iron, which would be almost certain to ensue if the projectile were cast solid. In the shell the cavity is made larger to accommodate the bursting charge. This charge is fired by the heat generated by the metal on impact, no fuse being used, and to prevent explosion taking place before penetration has been accomplished the inside of the shell has a layer of packing around its surface, while the charge is inclosed in a flannel bag. This charge, being at the base of the shell, has a tendency on exploding to increase the forward impetus. The studs are buttons or projections, arranged down the outer walls of the projectile, and fit into the grooves of the gun, the entire bearing of the missile being on these points. They are made of soft metal (usually an alloy of copper and tin), and are two in number for each groove in all guns of less than twelve inches caliber, except in case of cored shot. These studs are at equal distances from the center of gravity of the shot, and are uniform in projectiles for the same kind of gun. The screw plug is simply to close the cavity in the body, and is fitted into a bushing of wrought iron, which is inserted into the shell at its casting, the metal even when cast in sand being too hard for tool work. The extractor holes are simply notches in the head of the shell for the purpose of withdrawing the shell from the gun after it has been charged.

PALLIUM, PALLA. These articles of Roman dress, corresponding to the Greek *himation*, are described in the article **COSTUME**, where also the pallium, as an ecclesiastical vestment peculiar to archbishops in the Roman Church, has been spoken of. In the East

the pallium is worn by all bishops, and one or two instances have occurred in the Western Church also in which it has been conferred by the pope on prelates of less than archiepiscopal rank. The canon law forbids archbishops to wear this vestment until it has been solemnly asked for (either personally or by deputy) and obtained from the holy see; even then it is only to be worn on certain specified occasions, such as at high pontifical mass or at an episcopal consecration. Every archbishop must apply for it within three months after his consecration, and it is buried with him at his death. The pallium is never granted until after payment of considerable dues. The pallia are prepared by nuns from white wool obtained from lambs which have been consecrated on St. Agnes eve in the church of that saint in Rome; the vestments are blessed on the festival of Saints Peter and Paul, and deposited for a night on the altar over St. Peter's tomb; they are afterward taken charge of by the sub-deacon, and given out as required.

PALM. From their noble aspect, and perhaps from the surpassing utility of several of the members of the group, the Palms (*Palmaceæ*) have been termed the princes of the vegetable kingdom. Neither the anatomy of their stems nor the conformation of their flowers, however, entitles them to any such high position in the vegetable hierarchy. Their stems are not more complicated in structure than those of the common butcher's broom (*Ruscus*); their flowers are for the most part as simple as those of a rush (*Juncus*). For all that, palms have always had great interest, not only for botanists, but also for the general public, in the latter case by reason of the historical and legendary interest connected with them no less than from their beauty and economic value. The order *Palmaceæ* is characterized among monocotyledonous plants by the presence of a stem very frequently unbranched, and bearing a tuft of leaves at the extremity only, or with the leaves scattered, these leaves, often gigantic in size, being usually firm in texture and branching in a pinnate or palmate fashion.

It is impossible to overestimate the utility of palms. They furnish food, shelter, clothing, timber, fuel, building material, sticks, fiber, paper, starch, sugar, oil, wax, wine, tannin, dyeing materials, resin, and a host of minor products, which render them most valuable to the natives and to tropical agriculturists. The Cocoanut Palm, *Cocos nucifera*, and the Date Palm, *Phoenix dactylifera*, have been treated under separate headings. Sugar and liquids capable of becoming fermented are produced by *Caryotal urens*, *Cocos nucifera*, *Borassus flabelliformis*, *Rhapis vinifera*, *Arenga saccharifera*, *Phoenix silvestris*, *Mauritia vinifera*, etc. Starch is produced in abundance from the stem of the Sago Palm, *Sagus Rumphii*, and other species. The seeds of *Elais guineensis* of western tropical Africa yield, when crushed and boiled, "palm oil." Cocoanut oil is extracted from the cocoanut. Wax is exuded from the stem of *Ceroxylon andicola* and *Copernicia cerifera*. A variety of "dragon's blood," a resin, is procured from *Calamus Draco* and other species. Edible fruits are yielded by the date, the staple food of some districts of northern Africa. The cocoanut is a source of wealth to its possessors, and many of the species are valued for their "cabbage;" but as this is the terminal bud whose removal causes the destruction of the tree, this is a wasteful article of diet unless care be taken by judicious planting to avert the annihilation of the supplies. The famous "coco de mer," or double cocoanut, whose floating nuts might have suggested the twin steamboats, and are the objects of so many legends and superstitions, is known to science as *Lodoicea Sechellarum*. The tree

is peculiar to the Seychelles, while it is used for many useful purposes. Its fruit is like a huge plum, containing a stone or nut like two cocoanuts (in their husks) united together. These illustrations must suffice to indicate the numerous economic uses of palms.

PALMA, the chief town of the Spanish province of Baleares, the residence of a captain-general, a bishop's see, and a flourishing seaport, is situated 135 miles from Barcelona, on the southwest coast of Majorca, at the head of the fine Bay of Palma, which stretches inland for about ten miles between Capes Cala Figuera and Regana. The population of the ayuntamiento was 60,000 in 1889. There is a considerable number of Christian Jews (Chuetas) who were formerly confined to their own quarter.

PALMA, distinguished since 1861 as Palma Campana, a city of Italy, in the province of Caserta, four and a half miles south of Nola. The population was 6,000 in 1889.

PALMA, distinguished since 1861 as Palma di Montechiaro, a city of Italy, in the province of Girgenti, Sicily, thirteen miles southeast of Girgenti. The population was 11,702 in 1889.

PALMA, one of the CANARY ISLANDS, (*q.v.*)

PALMA, JACOPO, a painter of the Venetian school, was born at Serinalta near Bergamo, toward 1480, and is said to have died at the age of forty-eight, or toward 1528.

PALMAS, LAS. See CANARY ISLANDS.

PALMER, EDWARD HENRY, Orientalist, was born at Cambridge, August 7, 1840. He was murdered in the African desert while on a journey with Captain Gill to procure camels for the English Egyptian expedition in 1882.

PALMER, SAMUEL, landscape painter and etcher, was born in London on January 27, 1805. He died at Reigate on May 24, 1881.

PALMERSTON, HENRY JOHN TEMPLE, VISCOUNT, statesman, minister of foreign affairs, and twice prime minister of England, was born at Broadlands, near Romsey, Hants, on October 20, 1784. It is no doubt owing to his birth and connections, but still more to his own talents and character, that Lord Palmerston was thrown at a very early age into the full stream of political and official life. Before he was four-and-twenty he had stood two contested elections for the university of Cambridge, at which he was defeated, and he entered parliament for a pocket-borough, Newtown, Isle of Wight, in June, 1807. Through the interest of his guardians, Lord Malmesbury and Lord Chichester, the duke of Portland made him one of the junior lords of the Admiralty on the formation of his administration in 1807. A few months later he delivered his maiden speech in the House of Commons in defense of the expedition against Copenhagen, which he conceived to be justified by the known designs of Napoleon on the Danish court. This speech was so successful that it marked him out as one of the rising statesmen of the day, in so much that, when Perceval formed his government, in 1809, he proposed to this young man of five-and-twenty to take the chancellorship of the exchequer, following apparently the examples of Pitt and Lord Henry Petty, who had filled that office at about the same age. Lord Palmerston, however, though extremely surprised and flattered by the proposal, had the wisdom to refuse it, on the ground that he was totally ignorant of finance, and had only once addressed the House of Commons. Nor did he allow the offer of a seat in the cabinet to break his modest resolution. He contented himself with the far less important office of secretary at war, charged exclusively with the financial business of the army,

without a seat in the cabinet, and in this position he remained, singularly enough, without any signs of an ambitious temperament or of great political abilities, for twenty years (1809-28).

In the spring of 1828 Palmerston began to direct his attention closely to foreign affairs. Upon the formation of Lord Grey's ministry of 1830, he entered the department of foreign affairs, in which he continued to exert his influence, both in and out of office, for twenty years.

The transaction of Lord Palmerston in the revolution of July, 1830, when a strong shock was given to the existing settlement of Europe, and when a conference assembled in London to settle the question which involved the independence of Belgium and the security of England, may be regarded as the most important act in his public life. In 1834 Lord Palmerston conceived and executed the plan of a quadruple alliance of the constitutional states of the West to serve as a counterpoise to the Northern alliance. A treaty for the pacification of the Peninsula was signed in London on April 22, 1834; and, although the struggle was somewhat prolonged in Spain, it accomplished its object.

The affairs of the East interested Lord Palmerston in the highest degree; and, when the power of Mohammed Ali in Egypt appeared to threaten the existence of the Ottoman dynasty, he succeeded in effecting a combination of all the powers, who signed the celebrated collective note of July 27, 1839, pledging them to maintain the independence and integrity of the Turkish empire as a security for the peace of Europe. During the administration of Sir Robert Peel, Lord Palmerston led a retired life, but he attacked with characteristic bitterness the Ashburton treaty with the United States.

In the revolution of 1848 which spread like a conflagration through Europe, and shook every throne on the Continent except those of Russia and Spain and Belgium, Palmerston sympathized openly with the revolutionary party abroad. No state was regarded by him with more aversion than Austria, yet he maintained that the existence of Austria as a great power north of the Alps was an essential element in the system of Europe. Lord Palmerston exercised over the foreign office an arbitrary control which the feeble efforts of the premier were unable to resist. Time and again it was shown that Palmerston could not be trusted, and he was constantly creating uneasiness in the cabinet. But the climax was reached when, on the occurrence of the *coup d'état* by which Louis Napoleon made himself master of France, the British minister expressed to the French ambassador in London, without the concurrence of his colleagues, his personal approval of that act of lawless violence. Upon this, Lord John Russell advised his dismissal from office (December, 1851). Palmerston speedily avenged himself by turning out the Government on a Militia Bill; but, although he survived for many years, and twice filled the highest office in the state, his career as foreign minister ended forever, and he returned to the foreign office no more.

Upon the formation of the cabinet of 1853, which was composed by the junction of the surviving followers of Sir Robert Peel with the Whigs, under the earl of Aberdeen, Lord Palmerston accepted the office of secretary of state for the Home Office. Upon the resignation of Lord Aberdeen and the duke of Newcastle, Palmerston was called to the head of affairs, and he entered, on February 5, 1855, upon the high office which he retained, with one short interval, to the day of his death. Palmerston was in the seventy-first year of his life when he became prime minister of England.

Defeated by a hostile combination of parties in the

House of Commons on the question of the Chinese War in 1857, he dissolved the parliament and appealed to the nation. In June, 1859, Palmerston returned to power.

Upon the outbreak of the American civil war in 1861, Lord Palmerston acknowledged that it was the duty of the British Government to stand aloof from the fray, but his own opinion led him rather to desire than to avert the rupture of the Union, which might have been the result of a refusal on the part of England and France to recognize a blockade of the Southern ports, which was notoriously imperfect, and extremely prejudicial to the interests of Europe. The cabinet was not of his opinion, and, although the belligerent rights of the South were promptly recognized, the neutrality of the Government was strictly observed. When, however, the Southern envoys were taken by force from the *Trent*, a British packet, Palmerston did not hesitate a moment to exact a full and complete reparation for this gross infraction of international law, which President Lincoln was wise enough to make. But the attitude and language of some members of the British Government at that crisis, and the active operations of the Southern cruisers, some of which had been fitted out by private firms in British ports, aroused a feeling of resentment among the American people which it took many years to efface, and which was at last removed by an award rather onerous to England. The last transaction in which Palmerston engaged arose out of the attack by the Germanic confederation and its leading states, Austria and Prussia, on the kingdom of Denmark and the duchies of Schleswig and Holstein. On October 18, 1865, he expired at Brompton Hall, after a short illness, in the eighty-first year of his age. His remains were laid in Westminster Abbey.

PALM SUNDAY (*Dominica in Palmis*), the Sunday immediately before Easter (see **HOLY WEEK**), in the Roman Catholic communion is characterized by a striking ceremonial which takes place in church at the beginning of the high mass of the day. Branches of palms and olive (held to symbolize "victory over the prince of death" and "coming of a spiritual unction") are blessed with prayer and aspersion, distributed among the clergy and laity. This is followed by a procession, upon the return of which to the church mass is said, palms being held in the hands of all during the singing of the Passion and Gospel. There is evidence that the feast of palms was observed, in the East at least, as early as the fifth century, but the earliest mention of a procession similar to that which now takes place on Palm Sunday both in the Greek and in the Latin communion occurs in an *Ordo Officii* probably not earlier than the tenth century.

PALMYRA is the name of a famous city of the East, founded by Solomon, and called Tadmor in the wilderness. Others claim that in 42 B.C. it was rich enough to excite the cupidity of MARK ANTONY (*q.v.*), and still others insist that it was originally an Arabic settlement. However this may be, the growth of the city was favored by the wars between Rome and Parthia, but its most splendid period began with the overthrow of the Nabataean kingdom of Petra (105 A.D.), which left it without a commercial rival. A quarter of a century later Hadrian, who had meanwhile taken Palmyra into his special favor, gave it, upon the occasion of his visit to the town, the name of Adrianapolis. At a later date, probably under Septimus Severus or Caracalla, it became a Roman colony, and the legislative power came into the hands of the senate and people under the administration of officers called *strategi*. During the third century the frequent eastern expeditions of Rome brought Palmyra into close connection with several emperors, and opened a new career of ambition to her

citizens in the Roman honors that rewarded services to the imperial armies. Houses thus distinguished were destined to play no small part in the world's history. Attempts were made at times to destroy the Roman supremacy, notably by Odænathus, but the outbreak was prevented and Odænathus assassinated. His son, Odænathus, who inherited the ambition of the father, and sought revenge for the latter's death, was, in 264, officially named supreme commander in the East, and though to the Romans he was a subject of the empire, he was among his own people an independent sovereign over all the lands from Armenia to Arabia, and able to count on the assistance of both these nations. Odænathus himself seems to have engaged in almost constant warfare against the Persians and perhaps the Scythians, the reins of government in his absence being firmly held by ZENOBIA (*q.v.*), the most famous heroine of antiquity, and to whom Aurelian ascribes the chief merit of her husband's success. In the zenith of his fame Odænathus was assassinated along with his eldest son Herod, it is generally assumed by Gallienus.

After the death of Odænathus, Zenobia, supported by her two generals, who were kinsmen of her husband, was called upon to meet and dispose of a Roman invasion. She held Egypt, Syria, Mesopotamia and Asia Minor as far as Ancyra; Bythia, too, was ready to join her party, had not the army of Aurelian appeared just in time from Byzantium. Her prudence and energy for a time defied the military skill of Aurelian, but he maintained the siege of Palmyra, and Zenobia figured in his splendid triumph. The date of her fall may be placed in the spring of 272. She accepted her fate with dignity and closed her days at Tibur, where she lived with her sons the life of a Roman matron. Within a year after the capture of Zenobia, Palmyra again revolted, but upon the approach of Aurelian yielded without a battle; the town was destroyed and the population put to the sword.

PALOMINO DE CASTRO Y VELASCO, ACISCLO ANTONIO, Spanish painter and writer on art, was born near Cordoba, in 1653, and studied philosophy, theology, and law at that capital, receiving also lessons in painting from Valdes Leal. After taking minor orders he removed to Madrid in 1678, and in 1688 he was appointed painter to the king. He visited Valencia in 1697, and remained there three or four years, again devoting himself with but poor success to fresco painting. Between 1705 and 1715 he resided for considerable periods at Salamanca, Granada, and Cordoba; in the latter year the first volume of his work on art appeared in Madrid. After the death of his wife, in 1725, Palomino took priest's orders. He died on August 13, 1726.

PALUDAN-MÜLLER, FREDERIK, the leading poet of Denmark during the middle of the present century, was born at Kjerteminde on February 7, 1809. He was educated at the cathedral school of Odense, and in 1832 he opened his career as a poet with *Four Romances*, and a romantic comedy entitled *Kjærlighed ved Hoffet* ("Love at Court"). This was succeeded in 1833 by *Dandserinden* ("The Dancer"), and in 1834 by the lyrical drama of *Amor og Psyche*. In 1835 he published an Oriental tale, *Zuleimas Flugt* ("Zuleima's Flight"), which was less successful than the preceding books. But he regained all that he had lost, by his two volumes of *Poems* in 1836 and 1838. He now left his native country for the first time, and spent two years (1838-40), in Germany, Italy, and France. The next dates in his career are those of the publication of his principal masterpieces—his lyrical dramas, *Venus*, 1841; *Dryadens Bryllup* ("The Dryad's Wedding"), 1844; *Tithon* ("Tithonus"), 1844; and *Adam Homo*, in three

volumes, 1844-48. His later works include *Abels Död* ("The Death of Abel"), 1854; *Kalanus*, an Indian tragedy; *Paradiset* ("Paradise"), a lyrical drama, 1861; *Benedikt fra Nurcia*, 1861; *Tiderne Skifte* ("The Times are Changing"), a comedy, 1874; and *Adonis*, a romance in verse, 1874. Besides these works, all of which are poetical, he published a story, *Ungdomskilden* ("The Fountain of Youth"), in 1865, and an historical novel in three volumes, *Ivar Lykke's Historie* ("The Story of Ivar Lykke"), 1866-73. He died in Copenhagen, on December 27, 1876.

PALWÁL, in Gurgáon district, Punjab, India, with a population of 11,000 in 1889, is a town of great antiquity, supposed to figure in the earliest Aryan traditions under the name of Apelava, part of the Pándava kingdom of Indraprástha. Its importance is purely historical, and the place is now a mere agricultural center.

PAMIERS, capital of an arrondissement, an episcopal see, and the most populous town (10,478 inhabitants) of the department of Ariège, France, lies on the right bank of that river, forty miles south of Toulouse, in the middle of a fertile and well-watered valley. Its wines were at one time in high repute.

PAMIR. See ASIA.

PAMPAS. See ARGENTINE REPUBLIC.

PAMPHILUS, an eminent promoter of learning in the early church, is said to have been born at Berytus in the latter half of the third century. After studying at Alexandria under Pierius, the disciple of Origen, he was ordained presbyter at Cæsarea, in Palestine, where the remainder of his life was spent. There he established a theological school; he also founded, or at least largely extended, the great library to which Eusebius and Jerome were afterward so much indebted. At the outbreak of the persecution under Maximin, Pamphilus was thrown into prison, and there, along with his attached friend and pupil Eusebius (sometimes distinguished as Eusebius Pamphili), he composed an *Apology for Origen* in five books, to which a sixth was afterward added by Eusebius. He was put to death in 309.

PAMPHLETS. The earliest appearance of the word is in the *Philobiblon* (1344) of Richard de Bury, who speaks of "panfletos exiguos," (chap. viii.) In English we have Chaucer's "this leud pamflet," Occleve's "go litil pamflet," and Caxton's "paunflettis and bookys." In all these examples pamphlet is used to indicate the extent of the production, and in contradistinction to book. The derivation of the word is a subject of contention among etymologists. The experts are also undecided as to what is actually understood by a pamphlet. Some bibliographers apply the term to everything, except periodicals, of quarto size and under, if not more than fifty pages, while others would limit its application to two or three sheets of printed matter, which have first appeared in an unbound condition. As regards its literary characteristics, the chief notes of a pamphlet are brevity and spontaneity. It has a distinct aim, and relates to some matter of current interest, whether religious, political, or literary. Usually intended to support a particular line of argument, it may be descriptive, controversial, didactic, or satirical. It is not so much a class as a form of literature, and, from its ephemeral character, represents the changeful currents of public opinion more closely than the bulky volume published after the formation of that opinion.

PAMPHYLIA, in ancient geography, was the name given to a region in the south of Asia Minor, between Lycia and Cilicia, extending from the Mediterranean to Mount Taurus, and bounded on the north by Pisidia, a rugged mountain tract. It was therefore a country of small extent, having a coast-line of only about seventy-five miles, with a breadth of about thirty. There can

be little doubt that the Pamphylians and Pisidians were really the same people, though the distinction between the two seems to have been established at an early period. Herodotus does not mention the Pisidians at all, while Ephorus mentions them both, correctly including the one among the nations on the coast, the other among those of the interior. Under the Poman administration the term Pamphylia was extended so as to include Pisidia and the whole tract up to the frontiers of Phrygia and Lycaonia, and in this wider sense it is employed by Ptolemy.

PAMPLONA (Pampeluna), a city of Spain, capital of the province of Navarre, and an episcopal see, is situated 1,378 feet above sea-level, on the left bank of the Agra, a tributary of the Ebro. The climate in general is cold and moist, but owing to the purity of the air and the excellence of its drainage the town is not unhealthy. From its position Pamplona has always been the principal fortress of Navarre. The streets are regular and broad; there are three "plazas," the principal of which, containing the Casa de la Diputacion and the theater, is sometimes on festive occasions turned into a bullring. The architect Ventura Rodriguez designed the superb aqueduct by which the city is supplied with water from Monte Francoa, some nine miles off. The town has a well-equipped secondary school, two normal and numerous primary schools; as well as an academy of design; and there are three hospitals. The surrounding district is fertile, producing wine as well as grain and other seeds; the manufactures are comparatively unimportant, the chief being that of linen. Population of ayuntamiento in 1877, 25,630, and in 1889 estimated at about 28,000.

PAN, a Greek god worshiped chiefly in Arcadia, among whose mountains he had numerous sanctuaries and holy caves. He was the herdsman's god, and the giver of fertility to flocks; a god of prophetic inspiration and of dreams, in which he sometimes revealed the cure of diseases; he was himself a huntsman and the god of hunters; he guided travelers on the pathless mountains, and even smoothed the rough sea by the sound of his flute; he was the god of music, of dance and of song. Echo and Syrinx were the objects of his love, and he sported and danced with the mountain Nymphs.

PANA, a growing town of Christian county, Ill., forty-two miles southeast of Springfield, has good railroad and banking facilities, newspaper offices, flouring mills, and machine shops. Population, 5,000.

PANÆTIUS, a Stoic philosopher, lived about 185-112 B.C. He belonged to a Rhodian family, but was probably educated in Pergamum and afterward in Athens. About 156 B.C. he came from Athens to Rome. He lived as a guest in the house of Scipio, and accompanied him in his final campaign against Carthage and in his expedition to Egypt and Asia, 143 B.C. He had an important influence in the introduction of Greek philosophy into Rome, and taught a number of distinguished Romans. He returned to Athens, probably after the murder of Scipio in 129 B.C., and succeeded Antipater as head of the Stoic school. In teaching he laid most stress on ethics; and his most important works, of which only insignificant fragments are preserved, were on this subject.

PANAMÁ, a state and city of Colombia, in the extreme north of South America. The city, which is the capital of the state and the seat of a bishop, is situated on the coast of the Pacific, at the head of the Gulf of Panamá, a few miles east of the mouth of the Rio Grande, occupying partly a tongue of coral and basaltic rock and partly a gentle rise toward Mount Ancon, an eminence 560 feet in height. In the rainy season streams of water flow down the streets, but in the dry season

the city is dependent on water brought in carts from the Matasnillo, a distance of several miles, the only perennial wells which it possessed having been dried up by the earthquake of March 8, 1883. By 1885, however, water-works introducing the water of the Rio Grande at a cost of \$250,000 were completed. Rents are high, and living is expensive. As Panamá, like Colon, is a free port, statistics of trade are not collected. The local exports are india-rubber (growing scarcer), gold-dust, hides, ivory nuts, manganese, shells, tobacco, cocobolo (a cabinet wood), tortoise-shell, vanilla, whale-oil, sarsaparilla, and cocoanuts. The Panamá pearl fishery is still prosecuted with success. Panamá (an Indian word meaning abounding in fish) was founded in 1518 by Pedro Arias Davila, and is thus the oldest European city in America, the older settlement at Santa Marie el Antigua, near the Atrato, having been abandoned and leaving no trace.

By the Isthmus of Panamá is sometimes understood the whole neck of land between the continents of North and South America; more generally the name is restricted to the narrow crossing from Panamá to Colon, the two other narrowest crossings being distinguished as the Isthmus of San Blas (thirty-one miles) and the Isthmus of Darien (forty-six miles). Nearly the whole isthmus, in the wider sense of the word, constitutes (since 1855) a state of the Confederation of Colombia, extending from the frontiers of Costa Rica to those of the State of Cauca. Besides Panamá, the capital, and Colon (Aspinwall), it contains Santiago, formerly chief town of a province and an apanage of the family of Columbus, Penonomé (about 15,000 inhabitants), Los Santos, formerly chief town of a province, Nata, and David. It is divided into six departments—Coclé, Colon, Chiriqui, Los Santos, Panamá, Veragua. The total population, in 1870, was 221,052.

It is the Isthmus of Panamá in the narrower sense which is crossed both by the interoceanic railway and by the proposed line of the interoceanic ship-canal. It affords a much shorter route than that of Darien, and while the central Cordillera does not sink lower than 980 feet in the Isthmus of San Blas, at the Culebra Col it is rather less than 290 feet high. As the watershed runs much nearer the south than the north side of the isthmus, the streams flowing to the Pacific are of comparatively little importance, while the Chagres on the Atlantic slope, with its tributary the Rio Obispo, forms a navigable river whose volume attains formidable dimensions at certain seasons. The railway (a single line) starting from Colon (on the swamp-island of Manzanillo on Limon Bay) reaches the valley of the Chagres at Gatun, runs along its northern flanks to Barbacoas, crosses the river by a large bridge, continues along the southern flank and up the tributary Obispo to the Culebra Col, from which it descends straight to Panamá. The ship-canal is to follow very much the same route. Its construction was begun in 1882, and continued until 1888, when, owing to lack of funds, it was abandoned. (See INTEROCEANIC CANALS.)

PANATHENÆA, the most splendid and brilliant of all the Athenian festivals, with perhaps the exception of the Great Dionysia. The mythic foundation is ascribed to Erechtheus; and Pausanias declares that the Olympia, the Lycæa, and the Panathenæa were the three oldest feasts in Greece. It was originally a religious celebration in honor of the patron goddess of the city, celebrated by her own worshipers. In addition to the religious rites there is said to have been a chariot race from the earliest time. Every fourth year the festival was celebrated with peculiar magnificence; gymnastic sports were added to the horseraces; and there is little doubt that Pisistratus aimed at making the

penteteric Panathenæa the great Ionian festival in rivalry to the Dorian Olympia.

The festival was made still more imposing under the rule of Pericles. He introduced a regular musical contest in place of the old recitations of the rhapsodes, which were an old standing accompaniment of the festival. The order of the *agones* from this time onward was—first the musical, then the gymnastic, then the equestrian contest. The season of the festival was the last days of Hecatombæon, and the great day was the 28th, third from the end of the month. The prize in the games was an amphora full of olive oil produced from the holy olives, the property and gift of the goddess herself.

PANAY. See PHILIPPINE ISLANDS.

PÁNCH MAHÁLS, a district in the east of Guzerat, Bombay presidency, India, with an area of 1,613 square miles. The southwestern portion is for the most part a level plain of rich soil; while the northern, although it comprises some fertile valleys, is generally rugged, undulating, and barren, with but little cultivation. The mineral products comprise limestone, sandstone, trap, quartz, basalt, granite, and other varieties of building-stone. Only recently has any attempt been made to conserve the extensive forest tracts, and consequently but little timber of any size is now to be found.

PANC SOVA, a town of Hungary, near the Servian frontier, is situated on the river Temes, just above its junction with the Danube, which it reaches nine miles above Belgrade. The town contains Roman Catholic, Protestant, and Greek churches, a convent, and manufactories of starch and beetroot sugar. Cotton and mulberries (for feeding silkworms) are cultivated, and a brisk trade in live stock and grain is carried on with Turkey. In 1880 Pancsova contained 17,127 inhabitants, partly Serbs and partly Germans. In 1889 the population was estimated at about 19,000.

PANDARUS, son of Lycaon, led the people of Zeleia in the Troad as allies of the Trojans against the Greeks. In other passages his country is named Lycia. Pandarus was worshiped as a hero at Pinara, in Lycia. Lycaon, the name of Pandarus' father, is merely an epithet of Apollo, the great god of Lycia. In mediæval romance Pandarus became a prominent figure in the tale Troilus and Cressida. He encouraged the amour between the Trojan prince and his niece Cressida; and his name has passed into modern language as the common title of a lovers' go-between in the worst sense.

PANDECTS. See JUSTINIAN and ROMAN LAW.

PANDERPUR, or PANDHARPUR, a town in Sholápur district, Bombay, India, situated on the right bank of the Bhíma river, with a population, in 1889, of 17,910. It is held in great reverence by the Bráhmans for its celebrated temple dedicated to Vithoba, an incarnation of Vishnu.

PANDORA. A woman fabled to have been made by Vulcan.

PANDUA, or PARRUAH. See GAUR.

PANGOLIN. In Africa, India, and Malayana are found certain curious mammals known to the Malays as Pangolins, to the English as Scaly Anteaters, and to naturalists by the scientific name of *Manis*. These animals, which, by a superficial observer, might be taken for reptiles rather than mammals, belong to the order *Edentata*, otherwise almost wholly confined to the New World, and containing, besides the Pangolins, the Sloths, Anteaters, Armadillos, and Aard Varks.

In size Pangolins range from one to three feet in length, exclusive of the tail, which varies from much shorter than to nearly twice the length of the rest of the animal: their legs are short; their ears are small; and

their tongue is long and worm-like, and is used to catch ants with. Their most striking characteristic, however, is their wonderful external coat of mail, composed of numerous broad overlapping horny scales, which cover the whole animal, with the exception of the under surface of the body, and, in most species, of the lower part of the tip of the tail. There are five toes on each foot, the claws on the pollex and hallux rudimentary, but the others, especially the third of the fore-foot, long, curved, and laterally compressed. In walking the fore claws are turned backward and inward, so that the weight of the animal rests on their back and outer surfaces, and their points are thus kept from becoming blunted.

Their skulls are long, smooth, and rounded, with imperfect zygomatic arches, no teeth of any sort, and, as in other ant-eating mammals, with the bony palate extending unusually far backward toward the throat. The lower jaw consists of a pair of thin styliform bones ankylosed to each other at the chin, and rather loosely attached to the skull by a joint which, instead of being horizontal, is tilted up at an angle of 45° , the outwardly-twisted condyles articulating with the inner surfaces of the long glenoid processes.

The single genus *Manis* may be divided into two groups. (1) The Asiatic Pangolins, characterized by having the central series of body-scales continued quite to the extreme end of the tail, by having many isolated hairs growing up between the scales of the back, and by their small external ears. There are three species, viz., *Manis javanica*, ranging from Burmah, through Malacca and Java, to Borneo; *M. aurita*, found in China, Formosa, and Nepal; and the common Indian Pangolin, *M. pentadactyla*, distributed over the whole of India and Ceylon. (2) The African species have the central series of scales suddenly interrupted and breaking into two at a point about two or three inches from the tip of the tail; they have no hair between the scales, and no external ear-conch. The following are the four species belonging to this group:—The Long-tailed Pangolin (*M. macrura*), which has a tail nearly twice as long as its body, and containing as many as forty-six caudal vertebræ; the White-bellied Pangolin (*M. tricuspis*), closely allied to the last, but with longer and tricuspid scales, and white belly hairs; and the Short-tailed and the Giant Pangolins (*M. temminckii* and *gigantea*), both of which have their tails covered entirely with scales. All the four species of the second group are found in the West African region, one only, *M. temminckii*, extending besides into south and eastern equatorial Africa.

PÁNIPAT, a decayed historical town in Karnál district, Punjab, India, situated on the Grand Trunk road, fifty-three miles north of Delhi. The modern town stands near the old bank of the Jumna, upon high ground composed of the debris of earlier buildings. The population numbers 25,022, including 16,917 Mohammedans.

PANIZZI, SIR ANTHONY, principal librarian of the British Museum, was born at Brescello, in the duchy of Modena, September 16, 1797. After taking his degree at the university of Parma, he became an advocate, and established himself at Lugano, where he published an anonymous pamphlet generally known as *I Processi di Rubiera*, an exposure of the injustice and illegalities of the Modenese Government's proceedings against suspected persons. Expelled from Switzerland at the joint instance of Austria, France, and Sardinia, he repaired to England, where he arrived in May, 1823. In 1831 Brougham, having become lord chancellor, used his *ex-officio* position as principal trustee of the British Mu-

seum to obtain for Panizzi the post of an extra assistant librarian of the printed-book department. At the same time he was actively prosecuting the most important of his purely literary labors, his edition of Boiardo's *Orlando Innamorato*. In 1837 he became keeper of printed books upon the retirement of Mr. Baber, and immediately set himself to grapple with the special tasks imposed upon him by the peculiar circumstances in which he found the library. Panizzi during ensuing years became by far the most influential official in the Museum, though he did not actually succeed to the principal librarianship until 1856, when he succeeded Sir Henry Ellis. The incidents of his administration were the improvement effected in the condition of the Museum staff by the recognition of the institution as a branch of the civil service, and the decision to remove the natural-history collections to Kensington. He retired in July, 1866, but continued to interest himself actively in its affairs until his death, which took place on April 8, 1879. He had been created a K.C.B. in 1869.

PANNA, or PUNNAH, a native state in Bundelkhand, India, situated for the most part on the tablelands above the Vindhyan Gháts, and containing much hill and jungle land, with an area of 2,568 square miles, and a population, in 1881, of 227,306.

PANNONIA, in ancient geography, is the country bounded north and east by the Danube from a point nine or ten miles north of Vindobona (Vienna) to Singidunum (Belgrade) in Mœsia, and conterminous westward with Noricum and Italy and southward with Dalmatia and Mœsia Superior. It thus corresponded to the southwest of Hungary with portions of Lower Austria, Styria, Carniola, and Croatia and Slavonia. Partially conquered in 35 B.C. (when the town of Siscia was taken), Pannonia (but probably only what was afterward known as Lower Pannonia) was made a Roman province by Tiberius in 8 A.D. Somewhere between 102 and 107 Trajan divided the province into Pannonia Superior and Pannonia Inferior.

PANORAMA is the name given originally to a pictorial representation of the whole view which is visible from one point by an observer who in turning around looks successively to all points of the horizon. In an ordinary picture only a small part of the objects visible from one point is included, far less being generally given than the eye of the observer can take in while stationary. The drawing is in this case made by projecting the objects to be represented from the point occupied by the eye on a plane. If a greater part of a landscape has to be represented, it becomes more convenient for the artist to suppose himself surrounded by a cylindrical surface in whose center he stands, and to project the landscape from this position on the cylinder. In a panorama such a cylinder, originally of about sixty feet, but now extending to upward of 130 feet diameter, is covered with an accurate representation in colors of a landscape. The observer stands on a platform representing, say, the flat roof of a house, and the space between this platform and the picture is covered with real objects which gradually blend into the picture itself. The picture is lighted from above, but a roof is spread over the central platform so that no light but that reflected from the picture reaches the eye. These panoramas were invented by Robert Barker, an Edinburgh artist, who exhibited the first in Edinburgh in 1788, representing a view of the city. Within the past fifteen years they have been employed in the United States to illustrate the most prominent engagements of the civil war of 1861–65. Among these, the panoramas of the battles of Gettysburg and Shiloh, of the capture of Atlanta and the contest between the Merrimac and

the Monitor are the more noted. They were painted by French artists, and are said, by soldiers and others in a position to judge, to be correct and artistic productions. Since their introduction similar enterprises have been established in various cities of the United States, the Siege of Paris, the Crucifixion and other historical subjects being treated.

The geometrical laws which guide the drawing of panoramas follow easily from the general rules for PROJECTION, (*q.v.*)

PANSY, (*Viola* sp.) This flower has been so long cultivated that its source is a matter of uncertainty. As we now see it, it is a purely artificial production, differing considerably from any wild plant known. By some it is supposed to be merely a cultivated form of *Viola tricolor*, a cornfield weed, while others assert it to be the result of hybridization between *V. tricolor* and other species such as *V. altaica*, *V. grandiflora*, etc. The changes that have been effected from the wild type are more striking to the eye than fundamental. Increase in size, an alteration in form by virtue of which the narrow oblong petals are converted into circular ones, and variations in the intensity and distribution of color—these are the changes that have been wrought by continued selection, while the more essential parts of the flower have been relatively unaffected. The stamens and pistil, in fact, present the characteristics of the genus *Viola*. In that genus the construction of the stamens and pistil is such as to favor cross-fertilization, and that circumstance alone would account for much of the variation that is observed. In practice it is customary to propagate by means of cuttings the varieties it is desired to perpetuate, while, if additional varieties are desired, reproduction by seed, and careful selection of seedlings, according to the desire or fancy of the cultivator, are had recourse to.

PANTÆNUS, head of the catechetical school at Alexandria at the close of the second Christian century, is known chiefly as having been the master of Clement, who succeeded him. He was the author of commentaries on various books of Scripture, all of which have been lost with the exception of a few insignificant fragments. His teaching work in Alexandria began before 180 A.D., and was brought to an end by the persecution of Septimius Severus in 202.

PANTELLARIA, PANTALARIA, or officially PANTELLERIA (the ancient Cossyra or Cosyra), an island in the Mediterranean, which, though only forty-five miles from the African coast to the south of Cape Bon, and seventy-five miles from the coast of Sicily, is included in the Italian province and circondario of Trapani. It is of volcanic origin, and its area is estimated at fifty-eight square miles. Its principal summit reaches a height of 2,440 feet. Hot sulphur springs occur in various places, and there is a small salt lake of somewhat high temperature, but there is a lack of fresh water. The principal town, Oppidolo or Pantellaria, on the northwest, lies around a port protected by two redoubts and a citadel now used as a prison. Trade is carried on with Algeria, Tunis, and Malta.

PANTHEISM. See THEISM.

PANTHER. See LEOPARD.

PANTOGRAPH is an instrument for making a reduced, an enlarged, or an exact copy of a plane figure.

PANTOMIME is a term which has been employed in different senses at different times in the history of the drama. Of the Roman *pantomimus*, a spectacular kind of play, some account has been given elsewhere (see DRAMA). To speak of the Western drama only, there is no intrinsic difference between the Roman *pantomimus* and the modern "ballet of action." As a matter of course, no fixed date can be assigned to the birth of

modern pantomime. In Italy the transition was almost imperceptible from the pastoral drama to the opera; on the Spanish stage ballets with allegorical figures and military spectacles were known already toward the close of the sixteenth century; in France ballets were introduced in the day of Mary de' Medici, and the popularity of the opera was fully established in the earlier part of the reign of Louis XIV. In other countries, where the favorite types of Italian popular comedy had been less generally seen or were unknown, popular comic figures such as the English fools and clowns, the German *Hanswurst*, or the Dutch *Pickelhering*, were ready to renew themselves in any and every fashion which preserved to them the gross salt favored by their patrons. In Germany, where the term pantomime was not used, a rude form of dramatic buffoonery long flourished, and threw back for centuries the progress of the regular drama. Curiously enough, the long-lived but cumbersome growth called pantomime in England owes its immediate origin to the beginnings of a dramatic species which has artistically furnished congenial delight to nearly two centuries of Frenchmen. Of the early history of *vaudeville* it must here suffice to say that the unprivileged actors at the fairs were at last allowed to set up a comic opera of their own. About the second quarter of the eighteenth century, the light kind of dramatic entertainment combining pantomime proper with dialogue and song enjoyed high favor with the French.

It was this popular species of entertainment which, under the name of pantomime, was transplanted to England before in France it had attained to any fixed form, or could claim for its productions any place in dramatic literature. Geneste, who has no record of it, dates the period when such entertainments first came into vogue in England about 1723. In that year the pantomime of *Harlequin Dr. Faustus* had been produced at Drury Lane—its author being John Thurmond, a dancing master, who afterward (in 1727) published a grotesque entertainment called *The Miser, or Wagner and Abericock*. Hereupon, in December, 1723, John Rich (1681–1781), then lessee of the theater in Lincoln's Inn Fields, produced there as a rival pantomime *The Necromancer, or History of Dr. Faustus*. He had as early as 1717 been connected with the production of a piece called *Harlequin Executed*, and there seem traces of similar entertainments as far back as the year 1700. But it was the inspiring influence of French example, and the keen rivalry between the London houses, which in 1723 really established pantomime on the English stage. It boots not to enumerate favorites of later days; the type of Christmas pantomime cherished by a generation now passing away has been preserved from oblivion in Thackeray's *Sketches and Travels in London*. The species still maintains its hold over sections of the grown-up public, and, though now only cultivated in a few of the leading London theaters, appears at Christmas 1883–84, according to professional statistics, to have multiplied itself in the capital alone by thirteen examples.

PANYASIS, of Halicarnassus, a poet of the early half of the fifth century B. C. He was a near relation of the historian Herodotus. According to some his father Polyarchus was brother of Herodotus' father Lyxes; according to others, Rœeo or Dryo, the mother of Herodotus, was a sister of Panyasis. He led a revival of the old Ionian epic poetry, and his younger contemporary Antimachus continued the movement. Only insignificant fragments of his works are preserved. Though not much thought of in his own time, he is praised by later critics. He was slain by Lygdamis, tyrant of Halicarnassus.

PAOLI, PASQUALE DE, generalissimo of Corsica, was the son of Giacinto Paoli, a Corsican patriot, and was born in the village of La Stretta, in the district of Rostina, April 25, 1725. After the hopes of the Corsicans were overthrown by the French in 1738, he accompanied his father to Naples, where he entered the military college. In an expedition against Calabrian bandits he greatly distinguished himself, and when, in 1755, he returned to Corsica he had acquired so high a reputation that he was chosen generalissimo in a full assembly of the people. His rule in Corsica, notwithstanding the distraction of the continual struggle to maintain its independence, had been marked by the introduction of many important reforms, such as the remodeling of the laws, the establishing of permanent courts, the regulation of the coinage, and the furtherance of various measures for the encouragement of agriculture, manufactures, and commerce. When, after the French Revolution, Corsica was numbered among the departments of France, Paoli agreed to return to Corsica as lieutenant-general and governor of the department; but the excesses of the Convention having alienated his sympathies, he, with the help of Great Britain, organized a revolt, and in 1793 was elected generalissimo and president of the council of government at Corte. Despairing, however, of maintaining the independence of the island, he, in 1795, agreed to its union with Great Britain, and on George III. being declared king returned to England. He died near London in February, 1807. Clemente, elder brother of Pasquale Paoli, also distinguished himself in the struggles of Corsica against the Genoese. Subsequently he retired to a convent at Vallambrosa, but at the end of twenty years returned to Corsica, and died there in 1793.

PAOLO, FRA. See SARPI.

PAOLO VERONESE. See VERONESE.

PÁPA, a large country-town of Hungary, in the district of Veszprim, lies on the Raab and Steinamanger railway, seventy-five miles to the west of Pesth. It is the seat of a fine chateau and park of the Eszterházy family, by whom the handsome Roman Catholic church, lined with red marble, was built in 1778. It also contains a Protestant church, a good Protestant school established about 1530, a Roman Catholic gymnasium, and three convents. A quaint one-storied edifice is shown as the house of Matthew Corvinus. The chief industries are weaving, wine-growing, and the manufacture of paper and stoneware. The population, in 1880, was 14,654.

PAPACY. See POPE and POPEDOM.

PAPAL STATES. See STATES OF THE CHURCH.

PAPER. The origin and early history of paper as a writing material are involved in much obscurity. The art of making it from fibrous matter, and, among other substances, from the wool of the cotton plant, reduced to a pulp, appears to have been practiced by the Chinese at a very distant period. Different writers have traced it back to the second century B.C. But, however remote its age may have been in eastern Asia, cotton paper first became available for the rest of the world at the beginning of the eighth century, when the Arabs captured Samarkand (704 A.D.), and there learned its use. The manufacture was taken up by them in that city, and rapidly spread through all parts of their empire.

With regard to the introduction of paper into Europe, it naturally first made its appearance in those countries more immediately in contact with the Oriental world. Besides receiving the names of *charta* and *papyrus*, transferred to it from the Egyptian writing material manufactured from the papyrus plant (see PAPYRUS), cotton paper was known in the Middle

Ages as *charta bombycina*, *gossypina*, *cuttunea*, *xylina*, *Damascena* and *serica*. The last title seems to have been derived from its glossy and silken appearance. It was probably first brought into Greece through trade with Asia, and thence transmitted to the neighboring countries. In the tenth century *bambacinum* was used at Rome. There is also a record of the use of paper by the empress Irene at the end of the eleventh or the beginning of the twelfth century, in her rules for the nuns at Constantinople. It does not appear, however, to have been very extensively used in Greece before the middle of the thirteenth century.

The manufacture of paper in Europe was first established by the Moors in Spain, the headquarters of the industry being Xativa, Valencia, and Toledo. In Italy also the art of paper-making was no doubt in the first place established through the Arab occupation of Sicily. But the paper which was made, both there and in Spain, was in the first instance cotton paper. The first mention of rag paper occurs in the tract of Peter, abbot of Cluny (1122-50 A.D.), *adversus Judæos*, cap. 5, where, among the various kinds of books, he refers to such as are written on material made "ex rasuris veterum pannorum." At this early period woolen cloth is probably intended. Linen paper was first made in the fourteenth century, when paper-making at length became a veritable European industry.

In Italy the first place which appears to have become a great center of the paper-making industry was Fabriano, in the marquisate of Ancona, which rose into importance on the decline of the manufacture in Spain. In 1340 a factory was established at Padua; another arose later at Treviso; and others followed in the territories of Florence, Bologna, Parma, Milan, Venice, and other districts. In Germany also factories were rapidly founded. The earliest are said to have been set up between Cologne and Mainz, and in Mainz itself about the year 1320. At Nuremberg, Ulman Stromer established a mill in 1390, with the aid of Italian workmen. Other places of early manufacture were Ratisbon and Augsburg. Western Germany, as well as the Netherlands and England, is said to have obtained paper at first from France and Burgundy through the markets of Bruges, Antwerp, and Cologne. France owed the establishment of her first paper-mills to Spain, whence the art of paper-making was introduced, as early as the year 1189, into the district of Hérault. The development of the trade in France must have been very rapid, for that country was soon in a position to supply her neighbors as well as to provide for her own wants. And with the progress of manufacture in France that of the Netherlands also grew.

In the second half of the fourteenth century the use of paper for all literary purposes had become well established in all western Europe; and in the course of the fifteenth century it gradually superseded vellum. In MSS. of this latter period it is not unusual to find a mixture of vellum and paper, a vellum sheet forming the outside leaves of a quire while the rest are of paper.

Manufacture of Paper.—Paper is a thin tissue composed of vegetable fibers (rarely of woolen fibers), resulting from their deposition on wire-cloth while suspended in water. At first it was entirely made by hand, but the invention, in 1798, of the paper-machine by Louis Robert, a clerk in the employment of Messrs. Didot, of the celebrated Essonnes paper-mills, near Paris, gave a new impetus to the industry. The first paper-machine was erected in 1804 at Frogmore Mill, near Boxmoor, Herts. In the United States it was not till 1820 that such a machine was started for the first time by Messrs. T. Gilpin & Co., on the Brandywine. Since that period, machine-made paper has gradually sup-

planted that made by hand for all except special purposes, and has been brought to a high state of perfection by subsequent improvements in the machinery.

Paper may be divided into three main classes—writing paper, printing paper, and wrapping paper. The staple of which writing and printing paper is made is, in Britain, rags and esparto; in America a considerable quantity of wood-pulp is used. The staple of wrapping papers is old ropes and in some cases jute. The best writing and printing papers are still made, whether by hand or machine, from rags.

The first process in the manufacture of paper is the preparation of the rags, which, after being cut, are subjected to the action of the willow and duster, and then boiled for ten hours in a solution of caustic soda. They are then reduced to pulp, cleansed and bleached, after which the pulp undergoes the sizing process. This consists in the deposition on the fibers of the substances of a mixture of resin soap treated with alum, which forms a divided precipitate of alumina. After the sizing material is incorporated, the pulp is ready for coloring. When this is done it is subjected to the operation of beating, and is next run into the chests of the paper-machine, flows through a strainer, spreads itself on a thin film, and, when sufficiently dried, passes between rollers, where it receives the first pressure. From these, partially dried pulp is sent through other press-rolls, over steam-heated cylinders, which communicate a gloss to the web of paper, and through other mechanical appliances, until it is wound upon a huge roller ready for the cutter and market.

In America the manufacture of paper was commenced during 1690 by William Rittinghuysen, at a point within the city limits of Philadelphia. In October, 1827, a paper-making machine of the Fourdrinier pattern was established at Saratoga, N. Y. Since those days invaluable improvements have been made in America, and the preparation of the pulp has also received the benefit of American discoveries. In this connection the introduction of wood-pulp and wood-fiber into the United States, late in the sixties, was an important innovation, as it brought down the price of printing paper more than one-half, so that the product which was sold in 1879 at from 8 to 9 cents is now (1890) held at from $3\frac{1}{2}$ to 4 cents. The process by which wood-fiber results was first introduced in Pennsylvania along in 1854, and consists of reducing the wood to its natural fiber by boiling in a chemical solution the constituent of which is alkalines. Recently it has been ascertained that the treatment of wood, by what is known as the "bisulphite process," more effectually disintegrates the wood and separates the fibers for conversion into paper. The fiber is made up into print and writing papers of standard grades.

PAPER HANGINGS. See MURAL DECORATION.

PAPHLAGONIA, in ancient geography, was the name given to a province of Asia Minor, situated on the Euxine Sea, and adjoining Bithynia on the west and Pontus on the east, while toward the south it was separated from Galatia by a range of mountains which may be considered as a prolongation to the east of the Bithynian Olympus. According to Strabo the river Parthenius formed the western limit of the region so called, and it was bounded on the east by the much more important river Halys. Although the Paphlagonians play scarcely any part in history, they were one of the most ancient nations of Asia Minor, as their name appears in the Homeric catalogue of the allies of Priam during the Trojan War. They are afterward mentioned by Herodotus among the races reduced to subjection by Cræsus, and Xenophon speaks of them as being governed by a prince of their own. At a later

period Paphlagonia passed under the yoke of the Macedonian kings, and after the death of Alexander the Great was assigned, together with Cappadocia, to Eumenes. It continued, however, to be governed by native princes until it was absorbed by the encroaching power of the neighboring kingdom of Pontus. In the settlement of Asia which followed the fall of Mithradates, Pompey united the coast districts of Paphlagonia with the province of Bithynia, but left the interior of the country under one of the native princes, two or three of whom followed in succession until the dynasty became extinct and the whole country was incorporated in the Roman empire. It reappears as a separate province in the fifth century.

PAPHOS, the name of two cities near the west coast of Cyprus. Old Paphos was on the river Bocarus, about ten stadia from the coast, near the promontory Zephyrium; it was the favorite city of Aphrodite, who is often styled the Paphian goddess. The place was subject to earthquakes; it was totally destroyed by a shock in the time of Augustus, and, being restored by that emperor, took the name Augusta or Sebaste, which, however, did not displace the old name. New Paphos was situated in a fertile plain, about ten miles inland from Old Paphos. There was a great festal procession from it every year to the temple of Aphrodite in the old city. It was a flourishing commercial place in the time of Strabo.

PAPIAS, bishop of the Phrygian Hierapolis in the first half of the second century, is mentioned by Irenæus as "an ancient man," "the hearer of John and the companion of Polycarp." According to the *Chronicon Pascale*, Papias suffered martyrdom at Pergamum in the year of that of Polycarp at Smyrna (163 A.D., or, according to other reckonings, 156).

PAPIER-MÂCHÉ (mashed or pulped paper) is a term embracing numerous manufactures in which paper pulp is employed, pressed and molded into various forms other than uniform sheets, such as ordinary paper and millboards. In the East the art has long been practiced, especially in Kashmir, where the manufacture of small painted boxes, trays, and cases of Papier-Mâché is a characteristic industry. About the middle of the eighteenth century Papier-Mâché work came into prominence in Europe in the form of trays, boxes, and other small domestic articles, japanned and ornamented in imitation of Oriental manufactures of the same class. Under the name of carton pierre, a substance which is essentially Papier-Mâché is also largely employed as a substitute for plaster in the molded ornaments of roofs and walls, and the ordinary roofing felts, too, are very closely allied in their composition to Papier-Mâché. Under the name of ceramic Papier-Mâché, architectural enrichments are also made of a composition, the constituents of which are paper pulp, resin, glue, a drying oil, and acetate of lead. Among the other articles for which the substance is used may be enumerated masks, dolls' heads and other toys, anatomical and botanical models, artists' lay figures, milliners' and clothiers' blocks, mirror and picture frames, tubes, etc.

Papier-Mâché for its weight is an exceedingly tough, strong, durable substance, possessed of some elasticity, little subject to warp or fracture, and unaffected by damp.

PAPIN, DENIS, French physicist, and one of the inventors of the steam-engine, was a native of Blois, where he was born in 1647. In 1661 or 1662 he entered upon the study of medicine at the university of Angers. Some time prior to 1674 he removed to Paris and assisted Huygens in his experiments with the air-pump; also introduced into the air-pump the improvement of making it with double barrels, and replacing by the two

valves the turn-cock hitherto used. He communicated to the Royal Society an account of his famous steam "digester, or engine for softening bones." In this instrument the principle of the safety-valve was applied for the first time. In November, 1687, he was appointed to the chair of mathematics in the university of Marburg, and here he remained until 1696, when he removed to Cassel. In 1705 Leibnitz sent Papin a sketch of Savery's engine for raising water, and this stimulated him to further exertions, which resulted, two years afterward, in the publication of a paper in which his high-pressure boiler and its application are described (see STEAM-ENGINE). In 1707 he resolved to quit Cassel for London, and on September 24th of that year he sailed with his family from Cassel in an ingeniously constructed boat, propelled by paddle-wheels, to be worked by the crew, with which he apparently expected to reach the mouth of the Weser. The expedition, however, came to an ignominious end at Münden, and Papin, on his subsequent arrival in London, found himself without resources and almost without friends. He died in total obscurity, probably about the beginning of 1712.

PAPINIAN, the most celebrated of Roman jurists, was *magister libellorum*, and afterward prætorian prefect under Septimius Severus. He was an intimate friend of the emperor, whom he accompanied to Britain, and before his death Severus specially commended his two sons to his charge. Papinian was faithful to his trust, and tried to keep peace between the brothers, but with no better result than to excite the hatred of Caracalla, to which he fell a victim in the general slaughter of Geta's friends which followed the fratricide of 212 A.D. Papinian's place and work as a jurist will fall to be discussed under ROMAN LAW, (*q.v.*)

PAPPENHEIM, GOTTFRIED HEINRICH, GRAF ZU, imperialist general in the Thirty Years' War, was born on May 29, 1594. In his twentieth year he joined the Roman Catholic Church; and zeal for his new faith induced him to enter the military service of King Sigismund in Poland, and afterward that of Maximilian, duke of Bavaria, head of the Catholic League. He received, in 1623, the command of a regiment of cuirassiers who became famous as the Pappenheimer, and with them he fought from 1623 to 1625 at the head of the Spaniards in Lombardy. In 1626 he crushed an insurrection of peasants in Upper Austria, and then went to the help of Tilly against Christian IV. of Denmark, and took a prominent part in the storming of Magdeburg. When Tilly died, Pappenheim aided Wallenstein in subduing Saxony. On his way to the lower Rhine he was summoned by Wallenstein to Lützen, where battle was about to be given to Gustavus Adolphus. Pappenheim threw himself into the conflict, and his attack was so furious that the enemy began to give way; but two musket balls penetrated his breast, and he had to be carried from the field. He died on November 17, 1632, the day after the battle.

PAPPUS, OF ALEXANDRIA, a geometer of a very high order, belongs to a time when already the Greek mathematicians of original genius had been succeeded and replaced by a race of learned compilers and commentators. According to Proclus, he was at the head of a school; but how far he was above his contemporaries, how little appreciated or understood by them, is shown by the absence of references to him in other Greek writers, and by the fact that his work had no effect in arresting the decay of mathematical science. In reading the *Collection* of Pappus, we meet with no indication of the time at which he himself wrote. If we had no other information than can be derived from a perusal of his work, we should only know that he was

later than Claudius Ptolemy, whom he quotes often and with respect. Suidas states that he was of the same age as Theon of Alexandria, who wrote commentaries on Ptolemy's great work, the *Almagest*, and flourished in the reign of Theodosius I., (379-395 A.D.)

The work of Pappus which has come down to us bore the title *Collection*. This collection, which consisted of eight books, we possess only in an incomplete form, there being no part remaining of the first book, and the rest having also suffered considerably.

PAPUAN LANGUAGES. The languages spoken in NEW GUINEA (*q.v.*) and other islands peopled by Papuas differ more widely from the Malayo-Polynesian languages than those of the Negritos in the Philippine Islands do from the dialects of the contiguous Malayan tribes. In fact, they form as separate a class by themselves as the Melanesian languages do as contradistinguished from the Polynesian group. The meager grammatical sketch of the Maför (or Nuför) language—the only one to which the Dutch missionaries have paid some attention, but which may be taken as a type of the class—furnishes almost the only information we have of this subject.

PAPYRUS, the paper reed, the *Cyperus Papyrus* of Linnæus, was in ancient times widely cultivated in the Delta of Egypt, where it was used for various purposes, and especially as a writing material. It likewise grew in Syria; and, according to Pliny, it was also a native plant of the Niger and Euphrates. From one of its ancient Egyptian names, *P-apu*, was derived its Greek title *papyros*. The first accurate description of the plant is given by Theophrastus. It grew in shallows of two cubits or less, its main root being of the thickness of a man's wrist, and ten cubits in length. The stem of the plant sprang up to the height of four cubits, being triangular and tapering in form. The tufted head or umbel is likened by Pliny to a thyrsus. Of the head nothing could be made but garlands for the shrines of the gods; but the wood of the root was employed in the manufacture of different utensils as well as for fuel. Of the stem of the plant were made boats, sails, mats, cloth, cords, and, above all, writing material. The pith was also a common article of food, and was eaten both cooked and in its natural state.

The widespread use of papyrus as a writing material throughout the ancient world is attested by early writers, and by documents and sculptures. The early use of papyrus among the Greeks is proved by the reference of Herodotus to its introduction among the Ionians. Papyrus also made its way into Italy, but at how early a period there is nothing to show. Under the empire its use must have been extensive, for not only was it required for the production of books, but it was also universally employed for domestic purposes, correspondence, and legal documents.

The account which Pliny (*N. H.*, xiii. 11-13) has transmitted to us of the manufacture of the writing material from the papyrus plant should be taken strictly to refer to the process followed in his own times; but, with some differences in details, the same general method of treatment had doubtlessly been practiced from time immemorial. The stem was cut into longitudinal strips for the purpose of being converted into the writing material, those from the center of the plant being the broadest and most valuable. The strips, which were cut with a sharp knife or some such instrument, were laid on a board side by side to the required width, thus forming a layer, across which another layer of shorter strips was laid at right angles. The two layers thus "woven" formed a sheet, which was then soaked in water of the Nile, and finally pressed and dried in the sun. Any roughness was leveled by polish-

ing with ivory or a smooth shell. But the material was also subject to other defects, such as moisture lurking between the layers, which might be detected by strokes of the mallet; spots or stains; and spongy strips, in which the ink would run and spoil the sheet. When such faults occurred, the papyrus must be remade. To form a roll the sheets were joined together with paste (glue being too hard), but not more than twenty sheets in a roll. The best sheet formed the first or outside sheet of the roll, and the others were joined on in order of quality, so that the worst sheets were in the center of the roll. This arrangement was adopted, not for the purpose of fraudulently selling bad material under cover of the better exterior, but in order that the outside of the roll should be composed of that which would best stand wear and tear. Besides, in case of the entire roll not being filled with the text, the unused and inferior sheets at the end could be better spared, and so might be cut off.

PARÁ, or SANTA MARIA DE BELEM DO GRAO PARÁ, one of the flourishing cities of Brazil, capital of the province of Pará or Grao Pará, lies on a point of land with sandy porous soil at the junction of the Gunamá with the Rio Pará or eastern arm of the Amazons, about seventy-five miles from the sea. Pará is regularly built, well paved, and well lighted. The houses, which seldom exceed two or three stories in height, are usually substantial structures of stone, and a general brightness of aspect is produced by red-tiled roofs and white, yellow, or even pink and blue colored walls relieved by dense tropical foliage. In the outskirts of the city the wealthy merchants have villas with very extensive grounds, and a little way beyond these begins the dense swamp-forest. Pará has a wonderfully pleasant and healthy climate, with a temperature extremely equable throughout the year. The importance of the city is due to its being the great emporium of the rapidly-developing trade of the Amazons. Two lines of steamers run between Liverpool and Pará; there are also a French line and a German line. A large trade is transacted with the United States, but mainly through English, French, German, and Portuguese houses. The principal exports are cocoa, Brazil nuts, hides, deer-skins, isinglass, balsam of copaiba, tonka beans, and Peruvian bark. In 1863 the total value of the imports was about \$2,500,000 and of the exports about \$2,600,000; by 1882 the duties paid to the custom-house amounted to \$4,077,963.

Population has been growing faster than the supply of houses. In 1819 the inhabitants were estimated at 24,500, but by 1850 they had declined to 15,000; in 1866 they were 36,000 (about 5,000 slaves); and they are now over 40,000. Besides a vast cathedral (1720) and the president's palace, Pará contains an episcopal palace (formerly the Jesuit college), a handsome theater, a large market building, a custom-house (formerly a convent, with two great towers), naval and military arsenals (the first of some size, with shipbuilding yards and a gridiron), a botanical garden, etc. About a mile from the city is the chapel of Our Lady of Nazareth, the most celebrated shrine in northern Brazil.

PARACELSUS. It seems now to be established that Paracelsus was born near Einsiedeln, in the canton Schwyz, in 1490 or 1491 according to some, or 1493 according to others. Of the early years of Paracelsus' life there is hardly anything known. His father was his first teacher, and took pains to instruct him in all the learning of the time, especially in medicine. At the age of sixteen he entered the university of Basel, but probably soon abandoned the studies therein pursued. He next went to Trithemius, the bishop of Sponheim and Würzburg, under whom he

prosecuted chemical researches. Trithemius is the reputed author of some obscure tracts on the great elixir, and as there was no other chemistry going Paracelsus would have to devote himself to the reiterated operations so characteristic of the notions of that time. He attached no value to mere scholarship; scholastic disputations he utterly ignored and despised, and especially the discussions on medical topics, which turned more upon theories and definitions than upon actual practice. He therefore went wandering over a great part of Europe to learn all that he could. In so doing he was one of the first physicians of modern times to profit by a mode of study which is now reckoned indispensable. In 1526 or 1527, on his return to Basel, he was appointed town physician, and shortly afterward he gave a course of lectures on medicine in the university. Unfortunately for him, the lectures broke away from tradition. They were in German, not in Latin; they were expositions of his own experience, of his own views, of his own methods of curing, adapted to the diseases that afflicted the Germans in the year 1527, and they were not commentaries on the text of Galen or Avicenna. It was insinuated that he was a profane person, that he was a conjurer, a necromancer, that, in fact, he was to be got rid of at any cost as a troubler of the peace and of the time-honored traditions of the medical corporations. Moreover, he had a pharmaceutical system of his own which did not harmonize with the commercial arrangements of the apothecaries, and he not only did not use up their drugs like the Galenists, but, in the exercise of his functions as town physician, urged the authorities to keep a sharp eye on the purity of their wares, upon their knowledge of their art, and upon their transactions with their friends the physicians. He departed from Basel in such haste that he carried nothing with him, and some chemical apparatus and other property were taken charge of by Oporinus, his pupil and amanuensis. He went first to Esslingen, where he remained for a brief period, but had soon to leave from absolute want. Then began his wandering life, the course of which can be traced by the dates of his various writings. He thus visited in succession Colmar, Nuremberg, Appenzell, Zurich, Pfäfers, Augsburg, Villach, Meran, Middelheim, and other places, seldom staying a twelve-month in any of them. In this way he spent some dozen years, till 1541, when he was invited by Archbishop Ernst to settle at Salzburg, under his protection. After his endless tossing about, this seemed a promise and a place of repose. It proved, however, to be the complete and final rest that he found, for after a few months he died on the 24th of September.

PARADISE is an old Persian word (*Pairidaēza* in the *Vendidad*) meaning an inclosure, a park. The Greeks use the word in the form *Paradeisos* of the parks of the Persian kings, and it was borrowed also by the Hebrews. The Septuagint chose the Greek form to translate the "garden" of Genesis ii.; other Greek and Latin versions followed them, and thus "paradise" became the usual ecclesiastical name for the garden of Eden, which has been spoken of under EDEN.

PARADISE, BIRDS OF. See BIRDS.

PARAFFIN. Reichenbach, in 1830, discovered in wood tar a colorless wax-like solid which he called paraffin (*parum affinis*) because he found it to be endowed with an extraordinary indifference toward all reagents. James Young conceived the idea of industrially working a comparatively scanty petroleum spring in Derbyshire, and subsequently found that an oil similar to petroleum is obtained by the dry distillation of cannel coal and similar materials at low temperatures. This discovery had also great results in America.

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